

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## Clerk's Gas Engine.

We publish this week an illustration of a new gas engine, which, on account of several very novel features, deserves most careful attention. It is known as the Clerk engine, and is manufactured by Messrs. Thompson, Stern & Co., London, England. This engine is not only of unusual power for its size, but it has the additional peculiarity that a charge of gas and air is taken and exploded at every stroke. The large amount of power developed is partially due to the latter fact. The engine comprises two cylinders, one the working, and the other the so-called "displacer" cylinder. The diameter of the former is 6 inches, and the stroke is 12 inches; the piston is connected to the crank in the ordinary manner, but the piston of the displacer cylinder, in which the pressure is very slight, never exceeding 5 pounds to the square inch, is driven off a pin in one of

pounds pressure, when the charge is exploded, the pressure rising to some 250 pounds per square inch, and driving forward the piston to the other end of the cylinder, when the exhaust is again opened, and the exploded gases escape, leaving the cylinder free for the next charge from the displacer. This series of operations takes place at every stroke. In the engine exhibited, the pressure at the end of the stroke is reduced to about 30 pounds to the inch, but in larger engines it is considerably lower, and may be as small as 5 pounds above atmospheric pressure, by means of a special expanding arrangement.

It will be noticed that a particular feature of this engine is the passing through the cylinder at each stroke a volume of pure air, which cools it down and at the same time thoroughly displaces all the residual gases from the previous stroke. To produce this result the capacity of the displacer

slide at the back of the engine, worked by an eccentric on the main shaft, and the same slide cuts off the supply of gas to the displacer cylinder at half stroke. The igniting device is very perfect, and as it is required to operate more frequently than in gas engines where explosions take place every second revolution, it forms also a novelty in detail. In the ignition slide is a cavity, from each end of which is a small port leading to opposite ends of the slide. At one end of the cavity is a perforated plate, through which the explosive mixture passes from the motor cylinder, communication being made by a small hole in the slide and a groove in the face of the slide, which is always in a passage in the engine face leading to the combustion chamber at the end of the motor cylinder. After passing through this perforated plate the mixture is ignited by a Bunsen burner, the flame filling the cavity and discharging at the port in the face of

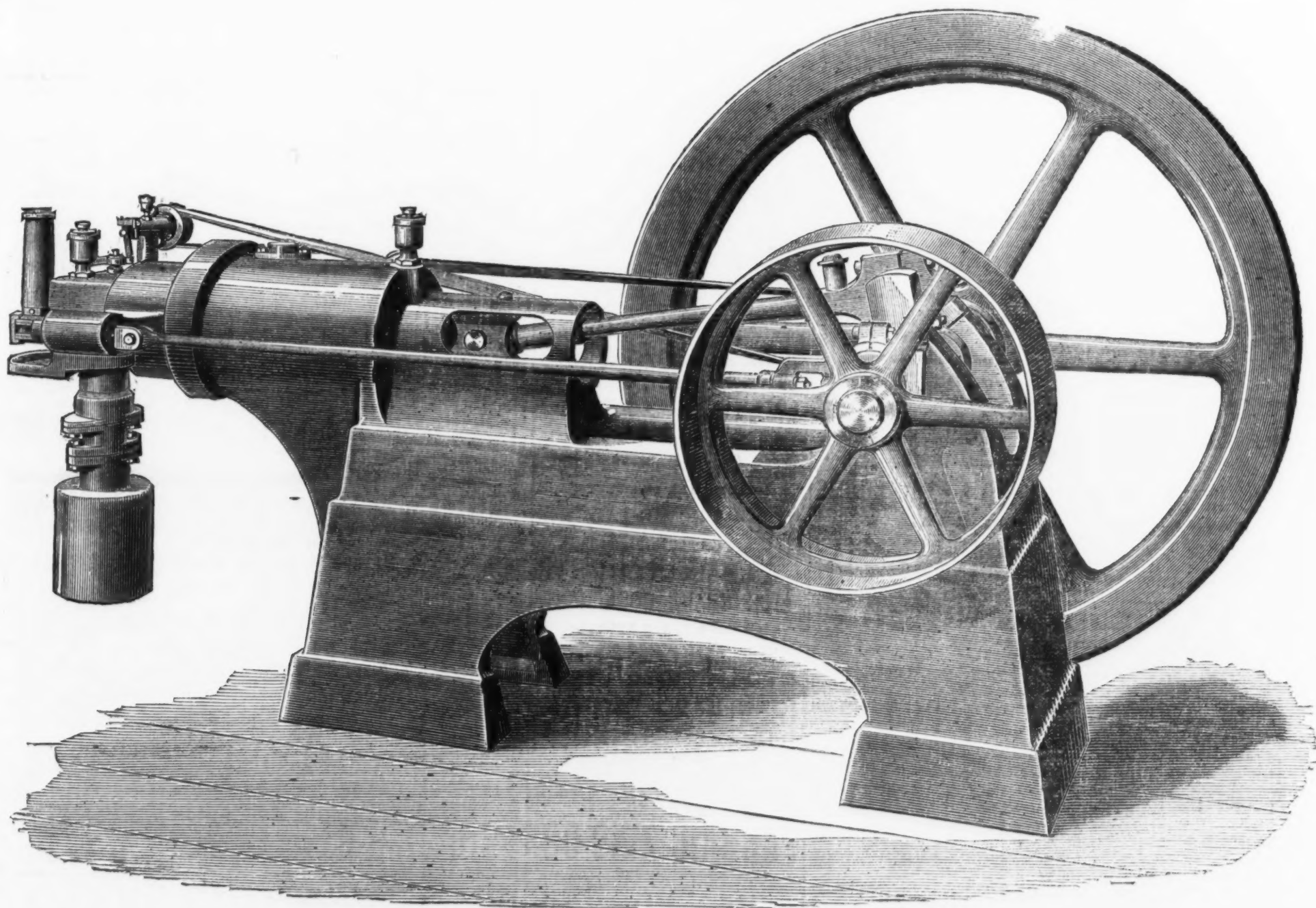
## The Montour Iron Company.

President Bond, of the Philadelphia and Reading Railroad, in a communication to the *Evening Bulletin* of the 2d inst., gave some further explanations of the statements in his recent pamphlet concerning the purchase of nine-sixteenths of the Montour Iron and Steel Company by the Reading, during Mr. Gowen's presidency, for \$450,000. Mr. Bond says that \$250,000 of the amount was to have been used to retire \$250,000 of the old mortgage bonds of the Pennsylvania Iron Company, then outstanding on the property purchased. The Montour Company was then to issue \$600,000 new bonds on the property, the Reading to guarantee interest and principal after negotiating them; this, however, was never done. Had it been done, the Reading was to have been remunerated for its payment of \$450,000, and the remaining \$150,000 realized was for use toward paying

mending the introduction of electricity in some of the first order sea-coast lights. An appropriation of \$50,000 for this purpose is asked for. The fog-signal service is said to be in a most efficient condition.

## Testing Underground Wires.

A test of the underground telegraph wires laid in Market street, Philadelphia, was made a few days ago, in the presence of a number of gentlemen from New York, Boston and Chicago. One of the rooms of the new Public Building had been connected by five wires with a store at Ninth and Market streets, and by a single wire with the dynamo-electric machine in the Grand Depot across the way. Three of the five running to Ninth street were connected with telegraph instruments. These, which



THE CLERK GAS ENGINE.

the arms of the fly-wheel. The pin is at right angles to the crank, and in advance of it. When the piston in the displacer advances, a combustible mixture of gas and air is drawn in during the first half of the stroke; the admission valve is then closed, and air is admitted during the remainder of the stroke. On the return of the piston a valve is opened, making a communication between the two cylinders. At this time the piston of the driving cylinder is at the outer end of its stroke, and an annular port is opened, communicating with the exhaust pipe. Through this opening the products of combustion from the last explosion pass, the pressure in the cylinder falls, and the cylinder is ready to receive its next charge from the displacer chamber. The first portion that enters the cylinder from the displacer is the pure air that passed in after its piston had reached the half stroke, and the combustible mixture of gas and air had been cut off. This flows through the motor cylinder, washing it out as it were at each stroke, and escaping through the exhaust until the latter is closed by the piston starting on the return stroke. Meanwhile the explosive mixture has followed the pure air into the motor cylinder, and remains, as the exhaust opening has now been closed. The returning piston compresses this mixture in a space at the end of the cylinder until it is about 45

chamber is larger than that of the driving cylinder and the space at the end into which the explosive mixture is compressed, and as half of each charge from the displacer is pure air, the desired object of cleaning and cooling the cylinder at every stroke must be attained. In large engines this device should be of the greatest possible service, as it should effectually prevent premature firing of the explosive charge, which would otherwise sometimes occur through the existence of sparks from the ignition of particles of carbon on the side of the cylinder. The volume of air which sweeps through the cylinder at each stroke in the Clerk engine, cools it down so as to prevent the existence of sparks, or if they should be created, removes them as it passes rapidly to the exhaust. The valve gear and cut-off arrangement are well designed and very simple. The mixed charge of gas and air is admitted into the displacer chamber by an automatic lifting valve, and another similar valve makes a communication between the displacer and the driving cylinder. This valve is actuated by the pressure of the air and gas in the displacer, but this pressure is very low, all that is required being sufficient to raise the valve and help to displace the residual gases left by the previous explosion in the motor cylinder. The ignition of the mixture at each stroke is effected by a small

slide; the movement of this latter opens this port into a port on the side of the combustion chamber, causing ignition at each stroke. So efficient is this arrangement that it will operate successfully at a speed of 300 explosions a minute, a far higher rate than can be obtained, or is indeed required by ordinary gas engines. Before the ignition slide is open to the combustion chamber, it is of course closed to the atmosphere; the ignition port is very small, 5 by 25 inch, so that a very moderate pressure keeps the slide to its face, even against the 250 pounds per square inch caused by the explosion. The slide being so small, there is no necessity for ventilating the port, as the mixture from the cylinder requires no exterior air to support its combustion. It may be mentioned that the admission valve to the displacer chamber, and that between this latter and the driving cylinder, are prevented from rattling by a very simple arrangement of air cushion. One of these engines is exhibited at the Paris Exposition and though it is a small one, with a cylinder only 6 by 12 inches, yet working at 145 revolutions it develops on the brake 6 horsepower, and indicates about 10. London *Engineering*, speaking of this engine, says that it considers the arrangement a most promising one, and such it certainly seems to be.

\$183,576 due the Pennsylvania Iron Company for old supplies and materials. The negotiation of the \$600,000 was unsuccessful. In fact, the old bondholders had refused to accept a surrender of the whole property in satisfaction of their claim of \$250,000, so it was impossible to borrow \$600,000 by mortgaging it. The old bondholders, however, agreed to surrender their \$250,000 of bonds upon the payment of 70 per cent. of their face in cash, or at the rate of \$175,000 for the property then owned by the Pennsylvania Iron Company. Mr. Bond explains that he alluded to this transaction to call attention not only to the extravagant price paid for an outside property off the line of road, but more particularly to the fact that a purchase had been negotiated by the officers of the Reading Company, withdrawing such a large sum of money from the treasury of the company at a time when its financial condition was such that within three months from the date of the negotiation all the property, both of the railroad and Coal and Iron Companies, was placed in the hands of the receivers.

The Lighthouse Board, in their annual report, speak of the great advances made in the appliances for generating electricity, and improvements in the burners in electric lamps. They feel justified in recom-

were all solenoid, or composed of one straight insulated wire wrapped by another, their ends being joined, worked perfectly. The "solenoid" is a new patented cable, prepared by Dr. Lugo, an Italian man of science, whose object is to overcome the induction of electric currents. In the tests alluded to above, as we learn from another source, no trace of induction or retardation can be detected. The solenoids conveyed electric light currents in one of the chambers of the conduit. In the same conduit were several earth and metallic currents, some of which were devoted to telephony and others to telegraphy. When no signals were sent over the conduit lines induction from the lines on the poles 60 feet above the level of the street was plainly noticeable in the telephone, and when the Morse circuits were worked the induced signals were so loud in the telephone circuits that one would almost believe the battery was in circuit with the telephonic line if the contrary had not been proved. Yet none of these signals were discernible in the instruments connected with the solenoids.

It is understood that the Western Union officials have been watching the results of the experiments above described with much solicitude. If the difficulty thus far experienced has been overcome, the fact is one of no ordinary importance.



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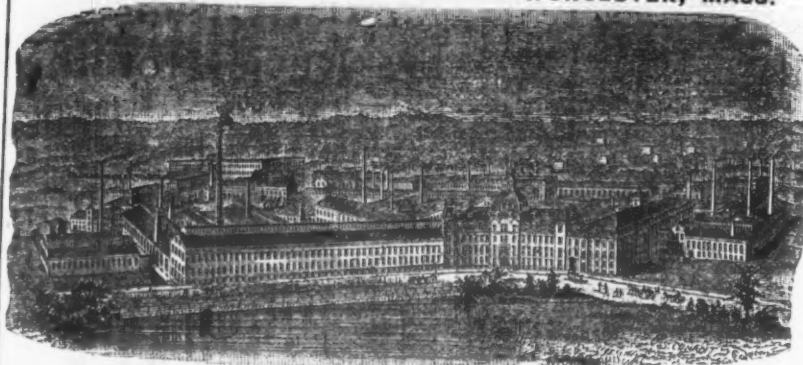
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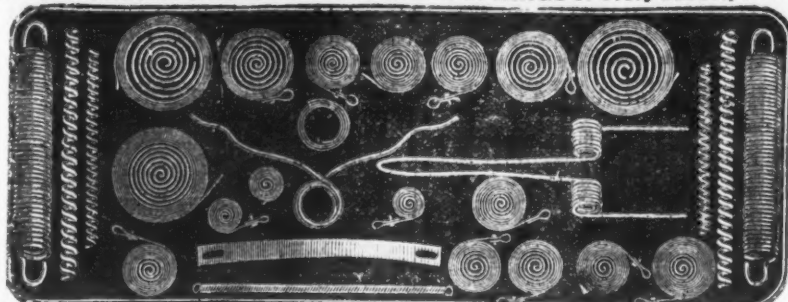




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The direction of movement to-day becoming known, and the character of the difficulties presenting themselves being ascertained, the way in which accelerated progress may be rendered possible becomes more easy of detection. In many cases we shall find ourselves able to decide precisely where to look for such progress, and in all directions we shall find our exploration interesting, gratifying and profitable. We will first examine those departments which supply us with our materials.

In that field to which we are apt to give too little consideration, notwithstanding the fact that it lies at the base of all our work, a field which—formerly cultivated by many of the greatest men that our profession has known—is now too generally neglected, while more seductive but less fruitful, and, on the whole, less immediately important departments are overcrowded with able workers, in that of the materials of construction, we are making steady progress on every side.

We are everywhere giving up the use of that expensive and perishable material, wood, and the weak and brittle minerals, and are substituting for them iron and steel. Iron is slowly, but steadily and inevitably, being displaced by steel. Cast iron in small parts is less and less used as steel castings become more and more reliable, and especially as the art of making drop forgings of larger size and in more intricate forms is perfected. Sheet steel, very low in carbon and other hardening elements, is becoming, year by year, more generally adopted in boiler making, not because of its greater strength, for the stronger grades are always rejected by the experienced boiler maker, but because of the greater uniformity, ease of working, freedom from cinder, and the durability of those grades which are well suited to such use.

A tenacity of less than 65,000 pounds per square inch and great ductility are demanded for this work. In rods and bars, and for sheets to be used where mechanical forces only are present, we are getting steel which, with a tenacity of 80,000 pounds per square inch (5624 kg. per square inch), stretch 25 per cent. before breaking, and we are sometimes given a grade very low in carbon, but high in manganese, which has 10 per cent. higher tenacity and equal ductility. In fact, we are apparently coming to a manganese steel as the metal for use in general construction.

In making alloys I have been able to show the existence of an alloy of copper, zinc and tin of maximum possible strength and to point out approximately its composition, and my discovery has been confirmed by other investigators, who have independently hit upon alloys closely related to this "maximum metal," and possessing properties of hardly less value. We now know that by carefully proportioning the constituents, by properly fluxing the alloy and by special mechanical treatment, we may obtain brasses and bronzes having strengths undreamed of by earlier engineers. Tenacities of from 75,000 to over 100,000 pounds per square inch have already been attained.

Dr. Fleissman's discovery of a method of making nickel malleable and capable of welding, and his similar improvement of commercial cobalt by the use of magnesium, is in itself important, and promises to lead the way to further progress.

The effect of variation of temperature in the annealing of iron and steel metals, and in the hardening and tempering of steel, has long been known. That annealed and unannealed wire differ widely in tenacity and in ductility, that very "mild" steel and good iron are softened by the very process which gives hardness to steel, are long familiar facts, and it has probably been long known to many engineers that there exists a critical temperature, probably definite and fixed for each grade, at which the hardening of steel occurs. Passing this point in cooling the metal takes on its temper, but variations of temperature on either side that point produce no observable effect on its condition, however rapidly they may take place. This critical temperature has now been identified in certain cases, and may prove to be nearly the same for all steels.

Lauth's process has been applied with equal success to certain alloys of copper and tin, by Sears, in the United States, and later by Rosetti, in Italy, and very extensively and successfully by Uchatius, in Austria. Tobin has cold-rolled bronzes, approaching the "maximum" alloy in composition, and has attained tenacities exceeding 100,000 pounds per inch.

Preliminary straining to secure an elevated initial elastic limit with relief of internal stress is likely to be of service in the applications of iron and steel, as e. g. by cold-rolling, by "frigo-tension" and "thermo-tension," and by wire drawing, while it proves to be probably less effective with other metals. The experiments made for the Prussian Government by Wöhler and Spangenberg during a period of 15 years, and which have now been concluded eight years, are just becoming known to practicing engineers, and Wöhler's law, Launhardt's and Weyrauch's analyses of results, are found valuable checks upon usual methods of proportioning iron parts of structures. It is becoming known that not simply the load to be applied, but the frequency and the method of its application, and the condition of the structure as determined by earlier strains, must be considered in settling upon its dimensions, and upon the magnitude of the factor of safety.

A method of inspection which, as I showed 10 years ago, will safely determine the value of each piece, subsequently to be actually

put into the structure or machine, is now slowly becoming adopted, and we may hope that soon we may confidently assert of each bridge over which we ride, of each machine upon the strength of which depends safety of life and property, that its every part has been proven, by actual test before use, to be perfectly safe. Now that the great testing machine at Watertown Arsenal, set up by the unfortunately defunct board appointed in 1875 to test iron, steel and other metals, is at the service of the public, we may hope that such methods of test may hereafter become common, and that tests of full-sized parts of bridges and machines, made at private cost, may, to a limited extent at least, yield the knowledge that that board would have more systematically and at less expense have made familiar to engineers, had its life not been terminated at the very beginning of its labors.

The progress of art, directed by brain and sustained by energy, skill and enterprise, is well illustrated by the changes which have taken place in our textile manufactures. According to Atkinson, a century ago one person in each family was compelled to work, day in and day out, nearly the whole year, to furnish homespun and dress goods for the rest; to-day, such has been the progress in the introduction of mechanism and automata, that one day's work in the year will, on the average, be sufficient to enable each worker to supply himself with all needed cotton and woolen fabrics.

Speeds of cotton spindles have risen, during the two decades that my memory can follow the change, from 5000 to 7500 revolutions per minute. Looms then making 120 picks per minute make now, Mr. Webber tells me, as high as 160, and one hand takes charge of from 25 to 50 per cent. more work. The "Slasher" dresser does ten times the work of the old machine, supplying 400 looms in place of 40, and demanding the attendance of only one man and a boy, instead of two men and ten girls. Pickers handle a ton of cotton per day in place of a half or five-eighths ton. The cheaply made turbine driving these mills has completely displaced the old costly vertical wheel, doing the work with less water and greater steadiness. Its efficiency has risen from 70 or 75 to 80 and 85, and sometimes to 90 per cent.

When the last generation was in its prime our factories were in operation twelve or thirteen hours; "man's work was sun to sun, and woman's work was never done." To-day man works ten hours, and woman is coming to a stage in which she will work where, when and how she pleases. These three yards an hour was the product for a single operative; to-day ten yards per worker are produced. In twenty years the annual product in cotton mills has risen from 2½ tons to 3½ tons per annum per mill hand; wages have increased 20 per cent., and the buying power of the dollar has risen in much more than equal proportion, thus adding 50 per cent. to the comforts and luxuries of working people, permitting an increased number of happy marriages and comfortable homes, setting free the child-slaves of the mills, and turning them into the schools.

Where one hand then drove 40 spindles he now manages 60, and every 7 of the more than 10,000,000 of spindles in operation works up a bale of cotton each year and turns out \$100 worth of product. This product is supplied to the most indigent of our poor at a small advance on the 1½ cents for labor and an equal sum for raw cotton, which are expended in the manufacture of the cheapest grades. A still more striking fact is the distribution of our cotton goods to distant countries. A single mill operative at Fall River, Lowell or Providence makes each year cotton cloth enough to supply 1500 of the people who pay her wages by sending her ten. In regard to woolen manufactures we have the same story to tell.

The strength, durability and finish of all kinds of silks are constantly becoming more and more nearly equal to the best imported. Indeed, the ladies assure me that some makes of American silk wear much better than any of foreign make yet seen in our market, and that several grades have a finish which compares favorably with the very best of European silks. In variety and in quantity of goods produced a steady gain is to be noted.

Spinning frames occupy 1/400th the space and cost 1/20th as much per spindle as in the earlier days of the trade, and the cost of work has now become so small that \$5 per pound spent in wages make silk costing \$11.50. In machine work generally the distinctive American idea of manufacturing as opposed to the old methods of making parts of mechanism in large numbers is steadily progressing, thanks to the ingenuity of mechanics like our colleagues, Pratt and Whitney and others, in devising tools specially designed for the production of definitely limited kinds of work. The same wonderful genius of invention which produced the Whitney cotton gin, the Blanchard lathe, our screw machinery, and the more wonderful card-setting machine, has lately given us Seller's automatic gear cutter, the automatic turret lathe, and a thousand and one machine tools hardly less remarkable in construction and efficiency.

Turning to the examination of the present condition of the railroad system of our country—that system which, binding State to State with lines of steel, is our strongest safeguard against political dissension and disunion—we find that changes are everywhere in progress under the direction of the ablest members of our profession. It is now 70 years since Col. John Stevens, in his memorable correspondence with De Witt Clinton, urged the adoption of a complete system of steam transportation on railways, and asserted that the time would come when "suits of carriages," as he said, would make their journey, impelled by steam, with as much celerity in the darkest night as in the light of day, and stated that he "could see nothing to hinder a steam carriage moving on its ways with a velocity of 100 miles an hour," and that he "should not be surprised" at seeing them propelled 140 or 50 miles an hour. His contemporary,

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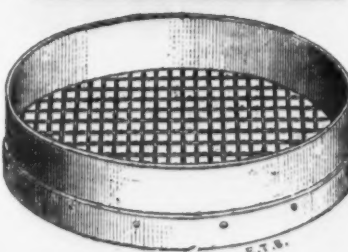
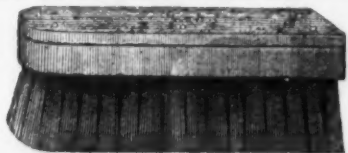
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Oliver Evans, wrote: "A carriage will start from Washington in the morning, the passengers will breakfast at Baltimore, dine in Philadelphia and sleep in New York the same day." But it was a generation later before these prophecies were credited; it was only when, 50 years ago, the introduction of railroads had an actual beginning.

To-day we have 100,000 miles of track laid down in the United States—we have about one-half of the constructed railroads of the world. Trains here and in Great Britain make 50 miles an hour on schedule time, taking water from the track, and receiving and delivering mails without stop. A speed of 100 miles—Stevens' maximum figure—has been many times obtained. Locomotives are frequently built weighing 50 tons; 70 tons has been reached, and every builder of engines is ready to guarantee the performance of an engine to draw 2000 tons 20 miles an hour on a level track. In coal consumption we have made some saving of late years. Three pounds of coal per hour and per horse-power is a usual power, and a consumption of 2.6 pounds of coal, and of 22½ pounds steam has been reported from recent locomotive tests.

The trapping of cinder and the reduction of intensity of combustion by extending grate area are late improvements. The time will come, and it should have come already, when the nuisance of flying dust and cinder will be unknown.

The efficiency of the late styles of stationary engines is illustrated by figures like these: Corliss obtains a duty, as reckoned from figures recorded by my assistant at a recent 12-hour trial of his last Providence pumping engine, of 113,875,580, without reduction or allowances, and the average of several days' trial is 112,000,000. Leavitt gives me data showing a duty for months together of about 105,000,000, and obtains a horse-power with an expenditure of 16½ pounds of feed water per hour at Lynn and 16.23 at Lawrence. His Calumet engine, with wet steam and but 200 feet piston speed, demands but 15 pounds, and the Hecla hoisting engine is credited with the wonderful low figure of 16 pounds. This, by the way, is the more remarkable from the fact that the jackets were disconnected. We thus sometimes meet with hints, apparently, that we may do better work with an under-heated than with an overheated cylinder jacket. The performance of the Westside pumping engines at Chicago, giving a duty of nearly 100,000,000 with lower heads only jacketed, is similarly significant.

This figure—16 pounds of steam per hour and per horse-power—may be put on record as the very best economy attained by our best engineers at the end of the decade 1870-1880. It is just double the weight which would be required in a perfect engine working steam of the same pressure at maximum efficiency. This leaves us still a fair margin for further advance in the construction of the engine. The steam boiler is at a standstill; there is but little margin for gain in economy, but a large gain in weight of steam supplied per pound of boiler may be expected when the tardily recognized advantage of forced circulation is secured.

Air and gas engines are here competing with stationary steam engines, and, so far as I can see, in no other field. The compressed air engine, the petroleum engine and the gas engine are all just now coming forward. I have no figures that I can rely upon except for the gas engine, which sometimes consumes as little as 15 cubic feet of gas per hour per horse power.

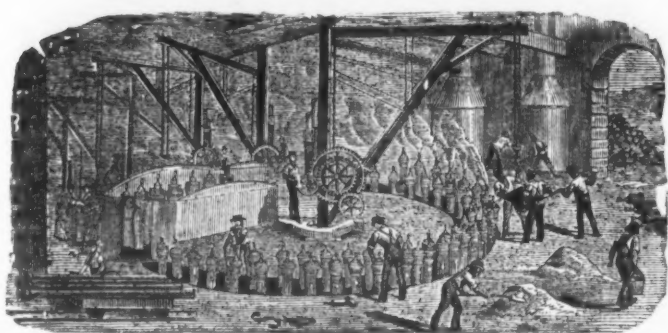
The solar motor proposed by Ericsson, the inevitably coming motor of some far-distant epoch, has, as yet, made no progress beyond the plans and experiments of the inventor.

The purely commercial aspects of steam-engine economy, familiar as they have long been to builders of expensive engines and to the more intelligent buyers, have barely attracted the attention of engineers generally, and have, as yet, apparently been entirely overlooked by all having a scientific standing, with, I think, the solitary exception of that greatest of modern scientific engineers, Rankine. A year ago, in debate, I called attention to the fact that economy in fuel was but one among the many items of expense incurred in the operation of steam machinery, and that it formed by no means the greatest part of such expense in certain cases. The inference at once follows that commercial economy, affected as it is by all these items, must be studied with reference, not to cost of fuel simply, but with a view to making total expense a minimum. Rankine called attention to this obvious conclusion many years ago, and a paper presented by two of our colleagues at the May meeting in Hartford, extending Rankine's work, and applying his approximately exact method to modern engines, showed that commercial efficiency is often made a maximum with very much smaller engines, and lower rates of expansion, than are found to give maximum economy of fuel. Such methods of determining size of engine will probably be generally adopted by engineers seeking the best interests of their clients. We are not, it is evident, to conclude, from the results of the application of the Rankine method of determining size of engine and maximum commercial efficiency, that we are always to lose so large a proportion of the gain obtainable by further expansion of steam. We conclude, rather, that the engineer must direct his attention to improvements designed to reduce these counteracting wastes. He must find methods of rendering the machine, including boiler, automatic, and thus of reducing cost of attendance; he must find ways of reducing first cost, as by increasing speed and making smaller engines do the work, as by finding ways of building cheaply, yet doing good work, and of making lubrication less costly, or of doing away with it altogether. Automatic firing or "stoking," automatic feeds, and automatic cleaning apparatus already in use, as well as automatic regulation of the engine, of steam pressure, of point of cut-off and of chimney draft. The "compound" engine has become the standard type of steam engine in use on shipboard as well as for stationary pumping engines. The direction and extent of recent advances



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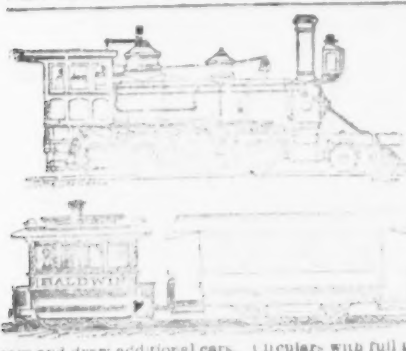
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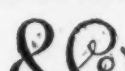
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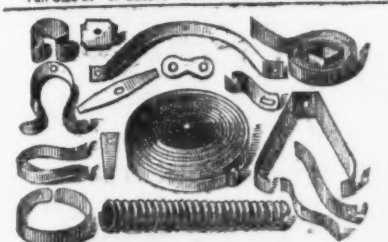
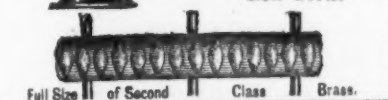
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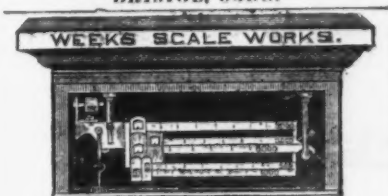
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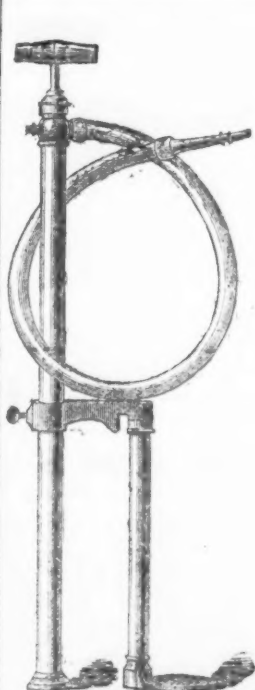
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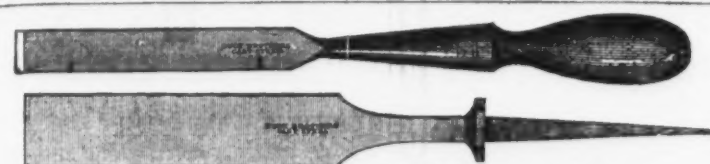
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Mag. Oxide of Iron.....	75.65
Protoxide of Iron.....	.83
Manganese Oxide.....	.09
Alumina.....	4.43
Lime.....	1.52
Magnesia.....	.27
Silica.....	14.89
Phosphoric Acid.....	.27
Sulphur.....	.42
Titanic acid.....	.27
Total.....	99.44

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in marine architecture are readily noted. The proportions of length of ship to breadth remain, as during several years past, about 10 to 1 or 11 to 1, about 50 per cent. greater than has been considered by some of the best engineers as that giving highest efficiency. The Great Eastern, 680 feet long, of 83 feet beam, and measuring 25,000 tons displacement, still remains the largest ship built; but steamers are under construction for Transatlantic lines 600 feet long, of over 50 feet beam, and fitted with engines of 10,000 indicated horse-power. A speed of twenty miles an hour in good weather throughout the voyage, making the distance from land to land in less than a week, may be expected soon to become usual. Double hulls and transverse bulkheads will make these great vessels safe even against the shock of collision with an iceberg.

Steam pressure has gradually and steadily risen since the time of Watt, when 7 pounds was usual. To-day 75 pounds per square inch is usual, and 90 pounds is often adopted. Such pressures have compelled the general introduction of the simplest form of steam boiler: the cylindrical tubular boiler with large flues beneath the tubes, in which the furnaces are formed.

During the past ten years steam pressure has risen from 50 to 75 pounds by gauge—and the consumption of fuel per hour and per horse-power has decreased from 2 to 1.8 pounds. Incidentally, the area of heating surface has decreased from 4½ to 4 square feet per indicated horse-power—that is to say, remaining, as formerly, nearly 2 square feet per pound of coal burned per horse-power per hour; where, as in some cases, pressures of 100 and 125 pounds are adopted, somewhat further gain may be expected.

Increased pressure has been accompanied by increased speed of piston—from 300 to 500 feet per minute—and both causes have combined to reduce greatly the size and weight of engines. Formerly 500 pounds per indicated horse power was a common figure; to-day one-half that weight is often noted, and in special cases in which, as in torpedo boats, economy is not important, one-fifth, and even one-eighth those weights are said to have been reached.

Surface condensation is almost exclusively adopted, but the area of cooling surface is becoming less and less, and at the pressure soon likely to become general, the production of a vacuum may possibly cease to be desirable, as it is already known to be with unjacketed cylinders; and the non-condensing engine may yet displace the condensing engine at sea as it has on land, and on our Western rivers where this comparison was earlier made, and where the evil effects of cylinder condensation were earlier perceived. A still for converting exhaust and waste steam into feed water has already been used, and it must remain in use in all salt-water navigation.

Among the most interesting events of the years 1880-1881 have been the trials of the steam yachts "Anthraxite" and "Leila." The first is a small vessel 86 feet long, 16 feet beam, and 9 feet draft, fitted with a three-cylinder compound engine, and carrying 100 pounds steam and upward.

Trials in London show these engines to have required but 1.7 pounds of coal and 17.8 pounds of steam per hour and per horse-power. Cylinder condensation amounted to 30 per cent. in the first cylinder, and of this nearly three-fourths was re-evaporated before discharge from the third cylinder.

The same engines tested in this country require 21.6 pounds (10 kilograms, nearly) of steam per hour and per horse-power, the cylinder condensation becoming over 50 per cent., of which four-fifths was re-evaporated before reaching the condenser, the difference being probably due to a variation in the efficiency of the steam jackets and in speed of engines. This little yacht—the smallest that ever crossed the Atlantic—should be remembered in history, quite as much on account of the lessons in engineering learned on board the little craft as on account of her far famous voyage.

The trial of the Leila, under the orders of the U. S. Navy Department, was even more instructive than that of the Anthracite. The Leila is a Herreshoff yacht 100 feet long, 12 feet beam (30 x 3¼ in., nearly), and measuring 37 tons. With a "coil" boiler, steam at 120 pounds at the steam chest (9 atmospheres), and driving the boat 15 knots an hour (17 miles), the engines developed 150 horse-power, using but 16.4 pounds of steam (7.5 kgr.) per hour per horse-power. The cylinder condensation amounted to but 10 per cent.

An important deduction from the results of the trial of the Anthracite and the Leila is, that efficiency has little relation to size of engine when protection against cylinder condensation is secured, and this conclusion is further justified by the fact that some of the very best work has been done, where non-condensing engines have been compared, by small portable engines. Steam engines of 5000-horse power are equal in economy by engines of one-fiftieth that power. A large difference in magnitude seems more than compensated by a moderate difference in steam pressure. Naval engineering is one of the most interesting and important branches of our profession, and the progress which has been made in its field during our generation illustrates the advances observed in nearly every other department. The old-fashioned mariner is rapidly disappearing, and the engineer is likely to become the responsible officer on the voyage as during construction.

Progress, if not more rapid in the Navy than in the Army, is more observable, and to me, at least, and perhaps partly because of my personal knowledge and closer relations, more interesting in its connection with engineering. A generation ago, the French "Napoleon" line of battle ship, with her 100 guns and 600 horse power engines, represented the most formidable of naval vessels. A little later—1856—our "Webach" class of screw frigates, with their fewer, but much heavier, guns, were thought the type of the coming fleet; but it was then that the modern ironclad came to revolutionize all naval warfare.

Those greatest of engineers, Robert L. Stevens and John Ericsson, and the greatest of naval architects, Edwin J. Reed, have led the way to the construction of the war ship

of to-day—a craft carrying ordnance weighing from 25 to 160 tons, at speeds varying from 12 to 16 knots; plated with from 14 to 30 inches of armor; and yet penetrable by their own guns—a great fighting machine, designed, constructed and mainly operated by engineers. But the revolution is impending that will produce, as yet, unknown changes.

Ten years ago I proposed a classification of naval vessels which was a little later again proposed by J. Scott Russell in a modified form. I stated that the increase so rapidly taking place in weight of ordnance and armor must sooner or later compel the division of all navies into three classes of ships and an independent service of torpedo vessels: 1. A class of vessels for service in time of peace, of moderate size and speed, carrying a few heavy guns unarmored and with great sail power. 2. A class of unarmored ships of very high speed under steam and carrying a light battery, such ships as might be best calculated to destroy the commerce of an enemy. 3. A class for heavy fighting, carrying the heaviest of guns and the most impenetrable of armor, with as high steam-power as possible, and rendered, by division into compartments, as nearly unsinkable as possible. A few years later, I stated that "the introduction of the stationary, the floating and the automatic classes of torpedoes and of torpedo vessels has now become accomplished, and this element, which it was predicted by Bushnell and by Fulton, three quarters of a century ago, would at some future time become important in warfare, is now well recognized by all nations.

Gunnery is a branch of our profession which has been too much neglected by engineers. Stronger and safer ordnance metal, breech-loading in place of muzzle loading, increased velocity of projectile, a flatter trajectory with less lateral drift, and with enormously increased range, are the features of changes now occurring. Whitworth's compressed steel, Krupp's breech mechanism and skillful design and construction have given us guns capable of driving shot at velocities of over 1200 feet per second with small arms, and nearly 2000 feet with heavy ordnance. Whitworth, with a comparatively small piece, has attained a range of nearly ten miles. The "machine guns" of Gardner, as built by Pratt and Whitney, and the Gatling and others, as constructed by the Colt Company and the Ames Manufacturing Company, firing a thousand shots a minute, have rendered the old methods of warfare entirely obsolete.

That feature of recent progress in engineering is the introduction of machine-made electricity, and of the electric light, but what seems to me the most important phase of this impending revolution is, I think, not yet generally comprehended.

A few months ago one of the earliest and best workers of all who have been with me, made a very painstaking investigation of the efficiency of a powerful dynamo-electric machine, kindly loaned him from Menlo Park. The mean of several series of tests gave, as a result, an efficiency of between 90 and 95 per cent. That is to say, of all the power transmitted to the machine from the steam engine driving it, over 90 per cent. appeared on the wire in the form of electrical energy. It follows at once that mechanical power may be transmitted through two such machines, again appearing as mechanical power, with a loss of less than 20 per cent.

I have sometimes said that the world is waiting for the appearance of three great inventors, yet unknown, for whom it has in store honors and emoluments far exceeding all ever yet accorded to any one of their predecessors. The first is the man who is to show how, by the consumption of coal, we may directly produce electricity, and thus perhaps evade that now inevitable and enormous loss that comes of the utilization of energy in all heat engines driven by substances of variable volume. Our electrical engineers have this great step still to take, and are apparently not likely soon to gain the prize that will yet reward some genius yet to be born. The second of these greatest of inventors is he who will teach us the source of the beautiful, soft-beaming light of the fire-fly and the glow-worm, and will show us how to produce this singular illuminant, and to apply it with success practically and commercially. This wonderful light, free from heat and from consequent loss of energy, is nature's substitute for the crude and extravagantly wasteful lights of which we have, through so many years, been foolishly boasting. The dynamo-electrical engineer has nearly solved this problem.

The third great genius is the man who is to fulfill Darwin's prophecy, closing the stanza:

Soon shall thy arm, unconquered steam, afar  
Drag the slow barge or drive the rapid car,  
Or, on wide-waving wings expanded bear  
The flying chariot through the fields of air.

The quotation may excite a smile to-day, but when first published, just 100 years ago, the last lines must have seemed hardly more extravagant than the first. And it is to-day true that we are getting on, that even in the science of aeronautics progress, although slow, is still to be observed year by year, and there is no department of engineering in which the art of the mechanic has opportunity for greater achievement.

When it is considered that it is only 95 years, last June, since the Brothers Montgolfier invented the balloon inflated with hot air, and that two months later M. Charles made use of hydrogen for inflation, it will, I am sure, be admitted that the progress which I am about briefly to sketch is far from being discreditable. Since Charles Green, the famous English aeronaut, just 60 years ago, substituted coal gas for hydrogen, the progress of ballooning has been rapid, and science is greatly indebted to Biot and Gay Lussac, to Flammarion, to De Foville, and especially to Glaisher, among balloonists, although, as yet little direct advantage has come to mankind from their efforts.

During the Franco-German war the great



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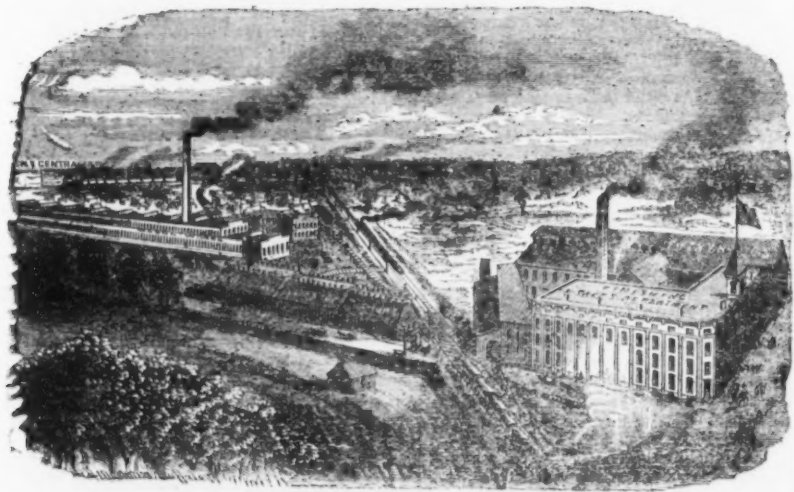
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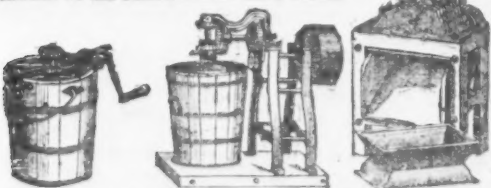
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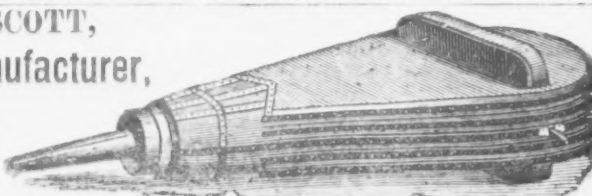


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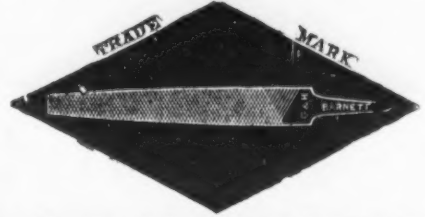
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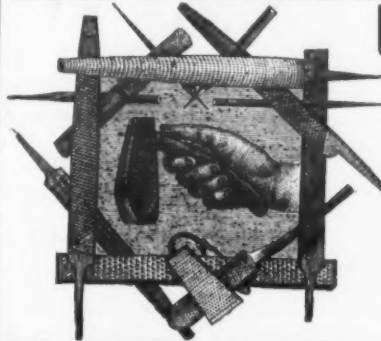

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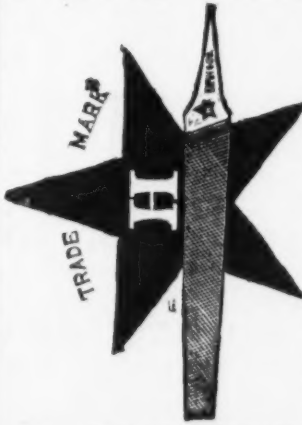
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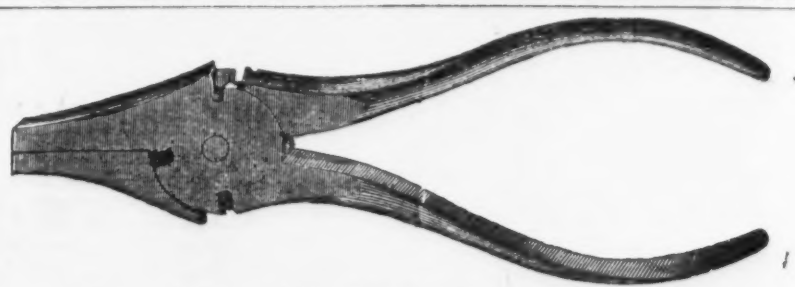
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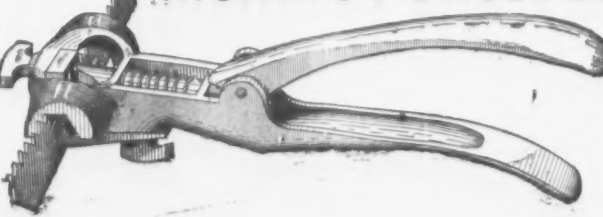
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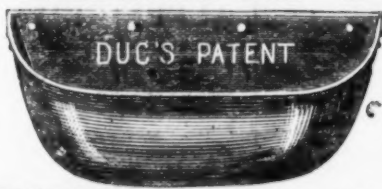
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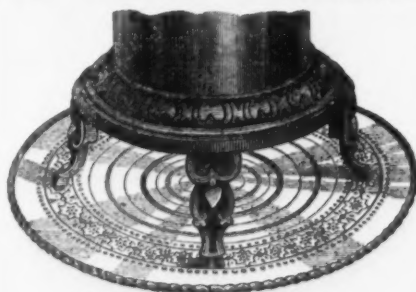
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French naval engineer, M. Dupuy de Lôme, succeeded in giving to the balloon a slow motion by means of a screw, and in directing its course by a rudder. His balloon was spindle or cigar-shaped, and contained 12,000 cubic feet of gas. It could carry 14 men, and the screw was worked by four or eight men. But while it could be moved slowly in calm weather, this machine gave no encouragement to hope that self-impelling balloons will ever become successful for navigation in even a moderate breeze. Our only hope lies in the direction of flying machines, lifted by their own power. And this scheme cannot hastily be condemned, nor by any means at once decided as chimerical. The carrier pigeon and the wild goose are but animated flying machines, and it can hardly be pronounced impossible that man shall yet compete with them in their own element. It has been shown that weight is probably not objectionable in aerial navigation, but actually a necessity; not weight but volume constitutes the impediment. A bird is a heavy but compact structure, of which the essential characteristic is that it incloses great power within small volume. De Lucy's measurements of various flying creatures show an irregular, but still unmistakable, general direction of variation of wing surface with size of animal. Comparing the lady-bird and the stag-beetle, the pigeon and the stork, the sparrow and the crane, we find the area of wing per unit of weight carried to be nearly as the cube root of their weights. Taking as a fair figure that obtained from the larger bird, I find that a man of no ordinary weight should be able to fly with wings having an area of only about 40 square feet. De Villeneuve states that a bat having the weight of a man would need wings only ten feet long.

Henson, Stringfellow, May and others have made self-impelling model flying machines, some of which have actually lifted themselves in the air, and several of which have flown with great speed when once lifted clear of the ground. But the most remarkable achievement of all, perhaps, is that of Henson in making a steam engine, fragile to be sure, but still a working machine, producing a third of a horse-power, and weighing less than 15 pounds. This machine was certainly more powerful than any bird of its weight could be. It is here that we seem most likely to be held in check, and it must be confessed that there is as yet but little on which to base an expectation of finding a satisfactory yet powerful motor.

### SCIENTIFIC AND TECHNICAL.

Examples of the mysterious failures of steel are not uncommon, and although much of the mystery which used to attend the qualities of steel is disappearing before modern research, it cannot be said that increased knowledge always leads to better confidence. Among several observers, Mr. Adamson has lately made experiments regarding the

WEAKENING OF STEEL BY HEAT, devoting his energies principally to the investigation of the peculiarities of spring and tool steel, which, although very flexible when cold, has been repeatedly found to break when at the blue annealing temperature. It has sometimes been supposed that only inferior metal is subject to this tendency; but the workers in Ural iron, which is remarkably pure in quality, have often observed the same action. Mr. Adamson has found that steel of this kind becomes actually "powdery" at a temperature of between 600° and 700° F., or the point at which willow twigs take fire; and he has decided that this is the point when the metal is at its weakest, possessing little or no coherence. This phenomenon, if it can be substantiated as universal or even frequent, is suggested as a possible explanation of a large number of accidents, such as the breaking of steel tires, shafts, and parts of machine tools which may be strong enough when cold, but being raised to the stated temperature by the effect of friction, &c., they are not able to withstand the slightest strain, and, in fact, drop into pieces by their own weight. The quickness with which broken parts of machinery or tools would, under ordinary circumstances, cool down, and therefore regain their strength, would naturally lead an ordinary observer away from the truth which Mr. Adamson claims to have discovered.

The process of gas purification has always been a source of experiment and speculation with many gas companies. The South Metropolitan Gas Company in London is now trying the

### DRY AMMONIA PROCESS FOR GAS PURIFICATION.

on a commercial scale at their works, and, according to the *Journal of Gas-Lighting*, it is carried out in the following manner. It is based upon the fact that commercial superphosphate of lime, when brought in contact with gas containing carbonic acid and ammonia, is converted into a mixture of carbonate of lime and phosphate and sulphate of ammonia, a product which is valuable as a manure, and its promoters expect will realize a higher price for ammonia than that obtained for it when removed by water. In the new process the gas, before passing through the ordinary purifiers for the removal of sulphuretted hydrogen by lime and oxide of iron, goes through boxes, in which it is exposed to layers of superphosphate 8 inches thick. About 2,500,000 cubic feet of gas per day pass through boxes containing about 120 tons of superphosphate, which, when saturated, hold about 10 per cent. of ammonia.

The *Génie Civil*, in an article on WATER GLASS,

some time ago, gave the following proportions used by English manufacturers for producing that article by fusion in crucibles: Pure quartz, 45 parts; powdered alkaline carbonate, 23 parts; charcoal, 3 parts. Another recipe is: Quartz sand, 100 parts; caustic soda or potash, 48 parts; and charcoal powder, 5 parts. Or, washed quartz sand, 65 parts; anhydrous alkaline carbonate, 34 parts; and charcoal powder, 4 parts. The mixture is heated to redness, until en-

tirely fused, and the contents are cast on tin plates for cooling, and finally crushed.

Experiments have frequently been made, and numberless speculations have been indulged in, with reference to the influence of temperature on the

### RESISTANCE OF STEEL TO FRACTURE.

The *Moniteur Industriel* states that the chief cause of variation in strength is the presence of sulphur; steel or iron containing no sulphur maintain the same breaking strain at all observed temperatures, the only change being a trifling variation of the limit of elasticity.

M. Catchinoff has introduced a very ingenious method of

### CONSTRUCTING PARABOLIC REFLECTING SURFACES.

by applying the principle according to which the surfaces of liquids when revolving about a vertical axis assume a parabolic shape. If a liquid is taken which after some time solidifies, a permanent paraboloid may be obtained. The inventor fixes a semi-spherical basin on a vertical axis capable of being revolved, and pours into the former a sufficient quantity of plaster of paris mixed with water. One of the essential requisites in the process is perfect uniformity of motion, for which reason the use of the steam engine as a source of motive power must be discarded. A small Gramme machine, or a Siemens dynamo-electrical machine will, however, answer the purpose admirably. The liquid used should possess slow solidifying and little contracting properties. Parabolic surfaces constructed in this way may be coated with silver or any other reflecting material, and will be found to yield satisfactory results.

The *Oesterreichisches Handels Journal* recently published an article on the

### EFFECT OF THE COLOR OF GLASS BOTTLES ON THE LIQUORS CONTAINED THEREIN.

in which the following interesting statements were made: Liquors contained in colorless bottles, when exposed for some time to the light, acquire a disagreeable taste, notwithstanding the fact that they may have been of superior quality before being so treated; liquors contained in brown or green bottles, however, remain unchanged in quality, even if exposed to direct sunlight. This phenomenon has not received proper attention heretofore, and quality has often been sacrificed for the sake of outward appearance. Since the results of the above treatment are due to the chemical action of light, it is advisable to use red, orange, yellow, green or opaque bottles for the preservation of liquors, while colorless, blue and violet ones should be entirely discarded.

As the result of an agitation recently carried on among the miners in the Manchester district, England, the weighing clauses of the Mines Regulation Act have now been generally adopted by the leading colliery proprietors. At the pits owned by Messrs. Andrew Knowles & Sons (limited) a couple of

### NEW PIT-BANK WEIGHING MACHINES,

in which quite a new principle has been introduced, have been put down by Messrs. Henry Pooley & Son, of Manchester and Liverpool. The machines are so arranged that the use of weights, springs, racks, pinions and wheels is entirely dispensed with, the principle upon which they are worked being the creation of a vacuum in a column of water. This is effected by a simple arrangement. An ordinary steelyard is, at the poise end, connected with what may be described as a piston, contained in a column of water, inclosed within a small tin can, and this takes the place of the usual poise weights. The pressure brought upon the short arm of the lever as the colliery tubs are passed over the weighing table causes the piston to be lifted through the column of water, and the weight passing over the table is instantly recorded by a moving figure on a quadrant dial, in proportion to the quantity of water displaced. A taring arrangement is also provided for allowing for the weight of the tubs, so that record given on the dial is the exact weight of the contents of the tubs. The action of the apparatus is remarkably quick, six weights per minute being readily taken over each machine, and Messrs. Pooley, who have applied the same principle to railway wagon weighing machines, claim that a whole train, while in transit over the tables, can be easily weighed without stopping. In connection with the pit-bank machines, another feature is the distance at which the weighing table can be placed from the weighing room, this, in the case of one of the machines at Messrs. Knowles' collieries, being 73 feet. The simplicity of the working parts removes to a great extent any liability to disarrangement in the machine, the danger most apparent in this direction being the possible action of the weather, either by evaporation or frost, upon the water column, but this is reduced to a minimum by protecting the apparatus under cover in the weighman's office. So far as the machines have been tried, they have given entire satisfaction.

The *Oesterreichisches Handels Journal* gives an interesting account of the

### USES OF CHLORIDE OF MAGNESIUM,

for which body a patent has been lately obtained as a non-solidifying liquid when subjected to the action of freezing agents. Among several examples, this journal mentions its application in increasing the weight of yarn, this material absorbing large quantities of the liquid. Legal measures have, however, been adopted for the prevention of this proceeding, which, it is hoped, will be successfully suppressed. In Starafurt the chloride of magnesium, which constitutes the greater part of the waste material of factories, and which formerly was allowed to flow into the passing river, has for a number of years past been used in the preparation of magnesium blocks for the lining of puddling furnaces in the process of dephosphorizing iron. On account of its fire-proof qualities it is a much-prized material for this purpose.

Herr Koellner, of Neumhulen, near Kiel, Germany, has just introduced an apparatus for the

### PURIFICATION OF LUBRICATING OIL,

rendering the latter fit for repeated use. The impure lubricant is gathered in a 19-

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ceiver, and from there slowly flows into a reservoir through a tube, a cock serving to regulate the flow. The solid particles held in suspension by the oil are here deposited, while the latter passes over a partition, and enters a second reservoir where the last traces of solid material are precipitated. The oil finally arrives in a compartment containing two boxes filled with clean cotton waste; these two boxes are separated by a slight partition, and the oil, after having passed through them, collects in a small basin, from where it may be removed by means of a cock. The intermediate reservoirs are also provided with cocks in order to facilitate the removal of sediment, and the various tubes are so arranged as to allow a free circulation of air. This apparatus is capable of furnishing about 30 kg. of purified oil daily, the amount depending to some extent upon the nature of the oil.

The last issue of Dingler's *Polytechnisches Journal* contains an article on

INDICATOR TRIALS OF PUMPS, by Mr. A. Riedler, in which the author dwells considerably on the speed of pump pistons, and expresses the opinion that the future of pump construction depends greatly upon the solution of the question of high piston speed. Although his views may not be sanctioned by many, it must be admitted that a considerably greater speed than that at present in use must sooner or later be adopted. Of course many difficulties will have to be overcome, and pumps will have to be improved in many respects before this end can be attained. Large valves of great weight and short travel have been recommended by some, and with the exception of great weight these qualities may be said to be essential. It has been repeatedly shown that with a collection of small valves a greater number of strokes could be attained than with a single valve of great weight. The indicator diagrams, showing the variation of pressure when the pumps were working slowly, are highly interesting. The author made several experiments with the pumps at the "Anallionschacht," in Kladno, Germany, and found that when all four were in operation, lines of uniform pressure were shown by the diagram, the speed of the pumps producing no variation whatever. When, however, the pumps were disconnected so as to cause only two of them to be in operation, then with 13 revolutions a gradual increase in pressure was observed, the pressure increasing in proportion as the speed decreased. With a speed of 20 revolutions per minute the pressure remained pretty uniform and no sudden variations were observed. The conclusions to be drawn from these observations are, that variations of pressure do not occur when the pumps work rapidly, and when several of them are combined, as in the above case, even slow speed will not cause any variations. The motion of the water column may probably serve to explain these phenomena. When working rapidly the motion of this column is more uniform than when working slowly. The same is true when several pumps are connected so as to operate together, instead of having only one pump in operation for the supply of the delivery pipe. Mr. Riedler, besides this question, dwells to some extent upon the weight of pump valves and pump construction in general, and will, in all probability, soon publish the results of additional experiments.

Messrs. Miller & Pfandner have introduced an

IMPROVEMENT IN COMPASSES, by means of which the indications can be read with great accuracy. The magnetic needle carries near its ends two thin disks of aluminum; upon each of the disks a fine line is drawn so as to indicate the plane in which the point of the needle stands. A microscope and vernier are attached, together with a small disk of paper or mica, which stands perpendicularly upon the needle so as to bring it more specifically to rest by means of the resistance of the air.

On the authority of Prof. Wanklyn, it is stated that he has made an

IMPORTANT DISCOVERY IN GAS MAKING, which promises to relieve gas companies of a good deal of anxiety with respect to the success of the electric light. From laboratory experiments it appears that it will pay well to distil the coal for the ammonia, irrespective of the gas, which may be considered as a waste product, or sold at a very small charge compared with the present one. By a dry process it is stated that the ammonia can be removed and made available for fertilizing purposes, for which it is such a valuable agent. The present process is to wash the gas in water, which dissolves and absorbs the ammonia, which is then obtained from the water and sold to agriculturists. By this system, however, much of the ammonia is lost, while by the new process all will be recovered. Some coal, it may be said, gives more ammonia than others, and a ton of coal gives from 10 to 25 gallons of water, the specific gravity varying from 2½ T. at 60° F. to 6 T. at 60° F., the specific gravity as a rule being the greatest where there is the least water. The price will be about 2 cents for each degree of specific gravity. The now valuable water and the tar, not so very long since, were considered of no value, but were turned into streams, which they polluted and poisoned. But both the ammoniacal water and the tar have become of considerable commercial value, and many vegetable products are now obtained from both. Sal ammoniac, which was formerly imported from Egypt, where it was extracted from the soot of camel's dung, has now its chief source in the ammoniacal gas water. It is also used to make alum, the vapors of the boiling liquid being forced through a mixture of aluminous earth and hydric sulphate, and the result is used in dyeing, tanning, as well as in various other manufactures. Other ammoniacal salts, such as ammonium carbonates, the sulphide, and the sulpho-cyanide are obtained from the gas water, which contains ammonia in such large quantities that it was stated by an eminent chemist that "if all the ammonia produced annually from coal in London alone were collected in its pure dry condition, the yield would be considerably over 3500 tons." The fact that the ammonia can be obtained in its dry state, may, therefore, be said to be a matter of more than ordinary importance, not only

to the agricultural community, but to chemists as well, seeing that it enters so largely into so many of our requirements for manufacturing as well as other purposes.

Some very interesting experiments were made a short time ago at the glass works of Messrs. Chance Bros. & Co., Smethwick, near Birmingham, England, with

## A POWERFUL LAMP,

which they have constructed to crown the summit of the South Head Lighthouse, Macquarie Harbor, Sydney, New South Wales. It is called a first order, dioptric, revolving light, with the electric arc. The lamp has a special arrangement of prisms for securing vertical divergence of the beam. It is over 6 feet in diameter, and the light is about 9 feet, and it is said to be the first time such dimensions have been applied to illumination by the electric arc. The lamp or regulator has a power of about 12,000 candles in the focus of light, and the merging beam has a luminous intensity exceeding 12,000,000 candles. The light will give flashes around half the horizon at intervals of a minute, and will make a complete revolution every 10 minutes. On an average the light will be visible a distance of 40 to 50 miles. The lamp was designed for Messrs. Chance by Dr. Hopkinson, F. R. S., and is constructed for the government of New South Wales. Its makers claim that it will be the largest and most powerful light in the world. The experiments were thoroughly successful, the light being so intense that it could hardly be endured by the naked eye.

Some instructive facts regarding the EFFECTS OF LIGHTNING ON TREES NEAR TELEGRAPH WIRES

have been brought to light by M. Montigny, in a recent examination of poplars forming part of a road in Belgium, between Rochefort and Dinant. The part in question is some 4600 meters in length and runs westward; it is level for some distance; then rises gradually to a height of 61 meters, through a wood, traverses a wooden plateau 200 meters in extent, and then descends, still through wood, to a plain. A telegraph wire runs near the row of Virginia poplars on the north side, and it appears that, out of nearly 500 poplars forming this row, 51, or a sixth, have been struck by lightning. Hardly any have been struck in the other row. The trunks have been mostly struck on their south side and nearly opposite the wire. Comparing different portions of the road, it is found that in the horizontal part none of the (129) trees show injury from lightning, or, at most, only one (a doubtful case), but as the road rises through the wood the cases quickly multiply, and on the wooded plateau as many as 9 out of 14 trees, or 64 per cent., have been struck. On the slopes the proportion is 25 per cent. M. Montigny distinguishes three kinds of injuries: 1. The bark torn and detached on a limited part of the trunk. 2. A furrow, straight or (rarely) spiral, made on the tree, from near the wire, down to the ground. 3. A peculiar oval wound, longer axis vertical, and lips colored light brown. Now, the furrows, which are probably due to the most violent discharges, are relatively more frequent on the plateau and on the western slope, while the storms usually reach first. M. Montigny is of opinion that the lightning, while provoked by the wire, does not strike this first, then the tree, but strikes the tree directly. His conception of the process is to the following effect: Suppose a thunder cloud charged with positive electricity. A long telegraph wire under it, though insulated, may acquire as great negative tension in the nearest part as if in direct communication with the ground, and the tension is greater the nearer to the cloud. While the inductive influence affects the wire most, near objects, such as trees, share in the influence according to their conducting power. The lightning, attracted in the direction of the wire, yet does not strike this, the insulating cups presenting an obstacle to its prompt and rapid escape. It finds a better conductor to earth in a neighboring poplar wet with rain. From the facts indicated it results that, of two similar houses, one built on a plain, the other in a wood, and having a telegraph wire fixed to them, the latter is the more liable to injury by lightning, and the danger is greater if the wood inclosing the house be upon an eminence.

## LABOR AND WAGES.

The Pittsburgh District Delegate Convention of Coal Miners assembled at Knights of Labor Hall, Eleventh street, on the 1st. Sixty-six pits were represented by delegates. The most important business transacted was the approval of the administration of the general secretary, D. R. Jones, and the election of officers. Heretofore the work of the presidential office has been done by the general secretary. There was a considerable number of delegates who had been instructed to vote for a continuance of the present mode of business, but, after discussion, the resolution to create the office of permanent president was carried. An election was at once proceeded with and resulted, almost unanimously, as follows: President, D. R. Jones; vice president, Joseph Schanning; general secretary, John Flannery. After adopting a few rules regarding mining, the convention adjourned, having been in session two days.

The carrying-in boys of the Nail City Glass House, Etnaville, Ohio, struck for 10 cents per turn advance on the 3d inst., the rate being 50 cents. The proprietors refused the advance and the works are stopped. The proprietors avow their intention of keeping the works closed until the boys are willing to work at the old rate.

The Philadelphia and Reading Railroad have been asked to advance the wages of their machine-shop employees.

Some utterances of dissatisfaction and rather ominous declarations regarding the future, emanating from the recent strikers at Cincinnati, have made their appearance in some of the papers. They are referred to at some length on the editorial page.

The Haytian government, in order to cure the confusion in its monetary system, has decreed the coinage of pieces containing nine parts of gold and one of alloy, which coin shall be called a *gourde*, each *gourde* to contain 100 centimes.



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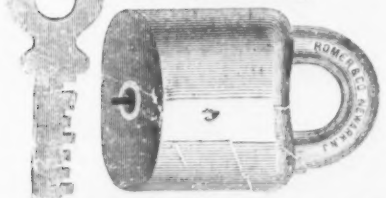
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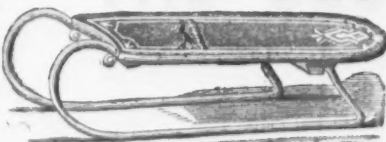
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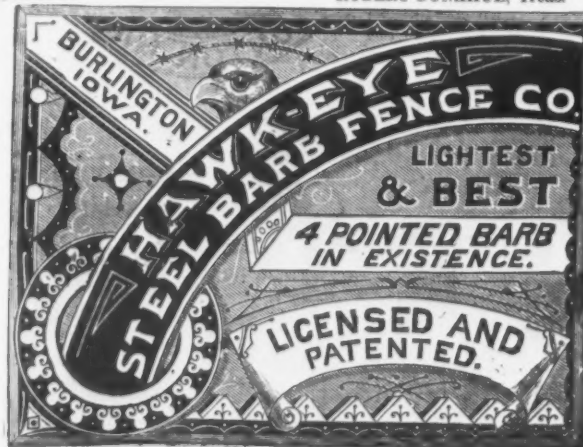
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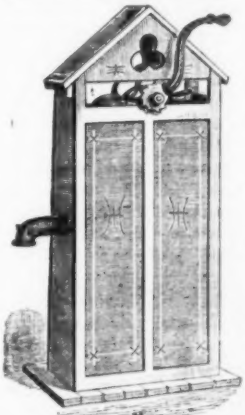


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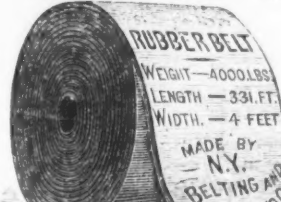
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This Packing is made in lengths of about 20 feet, and of all sizes from 1/4 to 2 inches square.

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### Private Brands of Tin Plates.

Our English correspondent sends us the fol-  
lowing:

As giving some useful facts relative to  
the inception and progress of the system of  
"private" brands, I have pleasure in plac-  
ing before your readers the following letter,  
written some time ago by a well-known tin-  
plate manufacturer to a firm of Liverpool  
exporters. I omit names and specific brands,  
&c., for obvious reasons. The writer says:

The broad distinction between your  
views and mine appears to be this: You  
say "charcoal" branded on a box means that  
the iron is made with charcoal as fuel. I  
say it does not of necessity do anything of  
the kind, but it is only an indication that  
the quality is up to a certain standard,  
which standard is indicated and qualified by  
the maker's brand, or the merchant's private  
brand. My views are as under: Before  
the year 1850 or thereabouts, so far as I  
know, tin plates were not distinguished com-  
mercially by the word "charcoal," nor were  
the boxes branded "charcoal," but the pro-  
duction of each maker was sold in the mar-  
ket on its merits. There were no fancy  
brands or merchants' private brands in those  
days. To my own knowledge plates of  
the highest quality known in the market  
were manufactured according to the speci-  
fication from iron made by three distinct  
modes, viz., from iron made originally in a  
finery with charcoal as fuel, from iron  
made originally in a finery with coal coke as  
fuel, from iron made originally in a pud-  
dling furnace with raw coal as fuel. All  
the product was sold with the same high-  
class brand upon it, and, intrinsically, the  
quality of all was the same, and was so  
recognized by buyers, who never inquired  
how plates were made, nor looked beyond  
the maker's brand for a warrant as to  
quality. To show the importance attached  
to the maker's brand at that time and how  
little regard was paid to the mode of man-  
ufacture, a certain brand, which had stood  
very high for many years, became, from  
causes unknown to buyers, of very in-  
ferior quality, and, although the makers  
restored the quality, a fatal injury had  
been done and a new brand had to be sub-  
stituted. I have written the foregoing to  
show that the quality of a plate was up to a  
certain time indicated by the maker's brand  
alone, and that there was no sign at all  
upon the box as to how the iron composing  
the plates was manufactured.

About the year 1850 there was, from a  
variety of causes, a great famine of tin  
plates of the better grades; there was great  
distrust as to the qualities of all tin plates—  
in Liverpool especially—inferior grades had  
been marked "charcoal," "best charcoal,"  
and "best best charcoal," and at the request  
and suggestion of merchants we, in order  
as they said to convince all doubters that  
our quality \*\*\* had not deteriorated (the  
mode of manufacture of which had not  
changed), added the word "charcoal." I  
will admit here that we made the tin plates  
then in the same manner as we had done  
before, viz., in three distinct modes.

This is the simple history of the adoption  
of the brand "charcoal" by us, and in re-  
gard to our \*\*\* brand we have con-  
tinued its use ever since.

We may mention we know another maker  
of an A 1 brand who did not for many years  
brand the word "charcoal" upon his un-  
doubtedly high-class plates, and we are  
doubtful if he does so even now. The mode  
of manufacture was known to us at the first  
date referred to, and if the word "char-  
coal" had been considered a warrant that  
charcoal iron alone was used, his position  
would have been just the same as our own;  
the reason, I believe, for his not falling in  
with the general custom was that his trade  
was chiefly for the home market and with  
consumers who knew the brand well. I have  
said thus much to prove that up to a certain  
date the maker's brand alone was relied  
upon as to the merits of tin-plates so far as  
regards their basis, iron.

About the years 1850 and 1851 a new  
epoch in the tin-plate trade occurred; new  
works were erected, followed by others;  
inferior and cheaper qualities of plates were  
made, and the word "charcoal," qualified,  
as it had been, by the maker's brand, was  
now generally used, and was further qualified,  
as time went on, by the addition of one  
or other of the words "first," "second," or  
"third." About this time the word "coke"  
began to be used as a distinctive quality brand,  
to denote that the plates so branded might  
fairly be sold at much less per box than the old  
brands of high reputation, whether marked  
"charcoal" or not. I am not a rare as a matter  
of certainty whether the plates first marked  
"coke" were made from iron produced in a  
refinery with coal coke fuel, but I have every  
reason to believe that they were made from  
iron originally manufactured in a puddling  
furnace, and that the mark representing  
quality did not represent the mode of man-  
ufacture, but only a grade of quality. It is,  
however, a notorious fact that, although  
there are three distinct commercial qualities  
of coke tin plates, viz., "best," "common"  
and something else below description, yet  
the great bulk, viz., the 2d and 3d qualities,  
and a very large portion of the first named  
(as I know), are made of iron originally  
worked in a puddling furnace with raw coal  
as fuel, and but an infinitesimal quantity is  
made or ever has been made of iron origi-  
nally worked in a refinery fire with coal coke  
as fuel.

Like A 1 charcoal plates, which had no  
brand upon them, and which were sold on  
their merits, many good coke plates, A 1 in  
point of quality, have no brand "coke" upon  
them, and they too are sold upon their  
merits upon the following reasoning:

If charcoal plates, acknowledged as such,  
but not branded "charcoal," were sold as  
charcoal however made (upon that point I  
refer to the early part of this document), why  
may not coke plates, if as good as some  
charcoal, which confessedly they are, be  
sold as charcoal?

I now come to the crucial question. Is it  
right for a manufacturer to put upon a box  
the word "charcoal" with the addition of a  
merchant's fancy brand, the quality of the  
plate being the same as what has been sold  
to the merchant as coke, but which word  
has never been put upon the box in connec-  
tion with the manufacturer's brand?

I think I have shown (to my own satisfac-  
tion at least) that up to 1850 the maker's  
brand alone was looked to as the test of  
quality, although there were three distinct  
modes of making first-class plates, and  
about that time the word "charcoal" was  
added, simply as a guarantee against decline  
in quality, that about the year 1850 or 1851  
coke plates began to be sold, but that the  
word "coke" did not indicate the mode of  
manufacture, but only a grade of quality,  
and that then, as now, it is not the word  
"charcoal" or "coke" which denotes the  
quality, but the trade-brand which accom-  
panies them. In further support of my  
views, I take your remarks in your letters  
and reply to the arguments in the order they  
occur.

First, then, I demur to the assumption that  
the word "charcoal" necessarily means  
that the plates are made of charcoal iron, for  
the reasons before given, but I admit that  
this brand ought to indicate "a more regular  
plate" than the brand "coke" should; at  
the same time, I quite agree with you in  
thinking "there is little doubt but that  
some best cokes are not inferior to some  
common grades of plates branded 'char-  
coal.'" Then there are plates known as  
"coke;" those called "best" are considered  
for some work equal to many charcoal plates,  
but hitherto they have been in most in-  
stances simply branded with makers' or  
private brand without the word indicating  
quality. This paragraph appears to me to  
admit that the words "charcoal" and "coke"  
(or the omission of the latter word) indicate  
grades of quality qualified by the accom-  
panying trade-brand, and are only recognized  
when taken in connection with such brand.

The next paragraph refers to the position  
we take up in branding charcoal with a  
fancy brand in addition upon our best coke  
plates for a buyer. We say we make only  
two qualities, charcoal and coke, no matter  
how made. We used not to brand the char-  
coal; we do not brand the coke now. Our  
friends, who know more of the market than  
we do, say in effect: Your cokes are as good,  
if not better, than some charcoal; why not  
brand them charcoal? We say: No, we  
shall not alter our plans. They say: Give  
us a private brand, and they, knowing how  
the goods stand in the market, relieve us  
of all responsibility, and simply, so far as we  
see, place the plates in the market as char-  
coal plates, to be sold on their merits among  
other brands, it being admitted even by  
yourselves that there are many common  
grades of charcoal not better than coke.

In respect to the third paragraph, we can  
understand an architect specifying charcoal,  
and we know if not confined by price he would  
specify \*\*\*; but taking it as a con-  
sumer's question, we cannot for one moment  
believe in the innocence of these gentlemen,  
unless American consumers are a different  
race to the English. Perhaps they are, but  
if so it is that they are more acute.

With regard to the fourth paragraph,  
we would say that there is always some  
danger of a trade running into one groove  
where any but the maker's brands are used;  
but this is a reason for doing away with all  
brands excepting the maker's, and I am  
almost inclined to believe that this is the  
only practical remedy for your complaint.  
The merchants were primarily answerable  
for the adoption of the word "charcoal" as  
a brand, as I have shown. The makers, I  
believe, are answerable for the adoption of  
the word "coke" as a brand. Now, as  
neither of these brands has ever been, in my  
experience, used as descriptive, and descrip-  
tive only, of the process by which the base  
iron has been made, I do not see any want  
of commercial rectitude in using them inter-  
changeably when no fraud is intended to  
the first buyer. Of course, if my premises  
are wrong (and I can only say they are his-  
torical facts), then my conclusions must be  
wrong also.

It is necessary to say that I think it is  
hardly fair to call upon a maker to alter or  
qualify his regular brands simply because  
some one on the other side of the water  
wants to know, by arbitrarily-used brands,  
the exact commercial quality of the article  
without testing it.

We make a tin plate known as "char-  
coal," and one known as "coke." The lat-  
ter is not branded "coke." Now, if your  
reasoning be right, that is not honest, al-  
though we tell you they are coke. Another  
friend, as explained in answer to second  
paragraph in first letter, says the coke are  
as good as charcoal. Mark them our pri-  
vate brand, and the word "charcoal" too,  
and we will take the risk, if any there be.  
It would seem that with our convictions we  
should ourselves have adopted a new brand  
with the word "charcoal," and have secured  
to ourselves the extra 25 to 50 cents per box.  
The sin of omission is venial, the sin of  
commission not so—where is the difference?  
If the use of a word is to be considered  
as a binding guarantee when it is desired  
for it to indicate a high quality, the omission  
of a word indicating a lower grade should  
be considered as an offense against business  
rectitude, although we all know what the  
object of the omission is.

The quality is admittedly variable both in  
charcoal and coke—some charcoals are  
inferior to best cokes (unbranded); a stand-  
ard cannot be defined except by reference  
to the trade brand, and this I hold to be the  
only safe means of judging, after the experi-  
ence of years. The conclusion I arrive at is  
this—that we make our \*\*\* cokes too  
good for coke quality, but so long as we use  
the brand \*\*\* upon our coke plates, it  
would be unsafe to use the word "charcoal"  
in addition, because it would tend to con-  
found the two qualities. Beyond this, I do  
not think there is any reason why it may  
not be honorably done.

I believe I could find, if it was essential,  
an original request from a Liverpool mer-  
chant, asking us to omit the word "coke" on  
our \*\*\* quality.

Note.—This well argued letter did not  
bring forth a reply from the firm to whom it  
was addressed.

The electric light has been introduced  
recently on a special train of Pullman cars  
of the Brighton Railway Company, England.  
Thirty-two Faure secondary batteries were  
employed to operate a dozen Swan lamps,  
and the illumination was said to have been  
satisfactory.



# The Iron Age

AND  
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New York, Thursday, November 10, 1881.

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The "St. Lawrence Tunnel Company,"  
organized through the efforts of Hon. Brad-  
ley Barlow, of St. Albans, Vt., are raising the  
necessary capital for an early commence-  
ment of active operations, and are negotiat-  
ing for a lease of railway lines, so as to form  
a direct connection between Montreal, Bos-  
ton and New York. Victoria Bridge, which  
spans the St. Lawrence, is virtually locked  
against all American roads by the Grand  
Trunk, with its extravagant freight and pas-  
senger charges, allowing no chance for com-  
petition. It is this obstruction which the in-  
ternational tunnel is to effectually overcome.  
The survey of the river was completed last  
winter before the breaking up of the ice,  
and is said to have conclusively established

the feasibility of the scheme. The tunnel  
will be from two to three miles in length,  
and will cost about \$7,500,000. Not more  
than three years will be required to finish it.

## The "Not Otherwise Provided for" Clause.

Two questions having a direct and import-  
ant bearing on the tariff on iron in its various  
forms, are pressing themselves upon the  
attention of the iron manufacturers of this  
country. These questions are so important  
that a solution must be reached as early as  
possible during the approaching session of  
Congress. The first relates to the "not  
otherwise provided for" clause—the "omni-  
bus clause," as it is commonly termed—of  
the tariff act, and the second to a reform in  
the method of interpreting the clauses of  
this act. Of the latter we shall speak again.  
It is the "not otherwise provided for" clause  
we wish to discuss at this time.

This clause, as it appears in the act of  
June 30, 1864, which is the present tariff  
law, re-enacted in the revised statutes of  
1872, reads as follows:

Manufactures, articles, vessels and wares not  
otherwise provided for, of brass, iron, lead, pew-  
ter and tin, or other metal (except gold, silver,  
platinum, copper and steel) or of which either of  
these metals shall be the component material of  
chief value, 45 per centum ad valorem.

A somewhat similar provision for steel  
reads:

All manufactures of steel or of which steel shall  
be a component part, not otherwise provided for,  
45 per centum ad valorem. But all articles of steel  
partially manufactured, or of which steel shall be  
a component part, not otherwise provided for,  
shall pay the same rate of duty as if wholly man-  
ufactured.

Whatever may be thought of the question  
of protection vs. free trade, there can be no  
doubt that the true spirit and intent of the  
tariff act was that the more work put in an  
article the higher duty it should pay. Though  
it would not be evidence in a court of law, it  
is a fact, and is evidence in a court of com-  
mon sense, that members of the Committee  
of Ways and Means that prepared, and the  
Congress that enacted this law, stated again  
and again, without challenge, that such was  
the intent of the law; and yet, under the  
decisions both of the Treasury Department  
and the courts, in very many cases, just the  
contrary practice has grown up, and the fin-  
ished article, or that form of an article on  
which the more work or labor has been  
expended, pays the less duty. A steel ingot,  
for example, pays a duty of 2½ cents per  
pound, but a steel railway bloom made out  
of an ingot pays less than ¼ of a cent. Hoop  
iron 1" X No. 18 pays 1½ cents per  
pound, but a "cotton tie" pays but a little  
more than half of this. Steel wire rods pay  
much less than the billets out of which they  
are made, and tin plates less than the sheet  
iron or sheet steel from which they are  
produced.

This is sheer injustice. Every one will  
acknowledge this; and the only room for  
difference of opinion is as to the method of  
remedying the injustice. Those importing  
will say, remedy it by reducing the rate on  
the material that pays the highest duty. The  
manufacturers and workmen in our mills  
say, remedy it by legislation that will exact  
on these articles no less rate of duty than  
that exacted on the material out of which  
they are manufactured. The latter is essen-  
tially what the McKinney bill provides for.  
This bill passed the last House of Representa-  
tives, but failed for lack of time in the  
Senate. It provides, in effect, that no article  
of iron or steel wholly or partially manufac-  
tured shall pay any less rate of duty than  
the article out of which it is manufactured.  
This, we submit, is only fair and just. It is  
the idea that pervades all tariff legislation;  
it is in accordance with the views of importers  
and all free traders who will consent to  
have any tariff, even for revenue. We do  
not mean to say that these men will favor  
this bill as it stands, or in view of the object  
it aims to accomplish, but the whole argu-  
ment is that raw materials should be admit-  
ted free, and the duty put on articles which  
are manufactured or on which labor has  
been expended. Assuming that we are to  
have a tariff, and perhaps for some time yet  
the one now in force, it seems only justice  
that some of the inconsistencies that have  
crept into it through decisions of the Treas-  
ury Department and the courts should be  
healed by some such bill as this, which will  
have the incidental advantage of relieving  
the Treasury Department of much embar-  
rassment in interpreting the "not otherwise  
provided for" clause.

The influx of foreign population continues  
without diminution. The total for the third  
quarter of 1880 was unprecedentedly large,  
reaching 155,233, but the third quarter of  
this year exceeds even that large total by  
nearly 17,000. Taking the last nine months  
together, in comparison with the correspond-  
ing period of 1880, the quota of emigrants  
sent out by the different nationalities is as  
follows:

FOR NINE MONTHS ENDED SEPTEMBER 30.

England and Wales..... 1881.  
Ireland..... 1880.  
Scotland..... 1881.  
Austria..... 1880.  
Germany..... 1881.  
Norway..... 1880.  
Sweden..... 1881.  
Canada..... 1880.  
China..... 1881.  
All other countries..... 1880.

Totals..... 1881.  
Compared with 1880, which at its close  
was the largest year in the history of immi-  
gration, we find the increase for the first

three quarters of 1881 to be 92,188, and  
each quarter has shown a gain. If each  
immigrant is worth to the country only the  
average price of a slave, the immigration  
of the current year already amounts to a  
gain in our national wealth of over \$500,-  
000,000.

## Large Production at the Troy Steel Works.

The Albany and Rensselaer Iron and Steel  
Company, at Troy, made a surprising and  
gratifying record of large production during  
the month of October. The following state-  
ment, which has been carefully verified,  
will be read with interest:

During the 24 hours of October 19 the con-  
verting works made 537 1232-2240 tons of  
Bessemer steel ingots; on October 27, on  
"C" turn of eight hours, 210 1568-2240  
tons, and for the 24 hours, 544 1568-2240  
tons of ingots were produced. For the  
week ending October 29 the converting  
works made 2906 896-2240 tons of ingots,  
and the rail mill rolled 2330 1120-2240 tons  
of steel rails. For the month ending Octo-  
ber 31, the two converters taking iron from  
but two cupolas at any one time, there being  
but three in the plant, produced 11,629  
1792-2240 tons of ingots; the blooming mill  
rolled all of them, and the rail mill turned  
out 8748 448-2240 tons of steel rails, giving  
an average of 0.083 per cent of seconds.

During the same time the various merchant  
steel trains of the Rensselaer department  
made as follows, tons:

18-inch train, of steel billets and bars, 1070 790-2240  
16-inch train, of steel billets and bars, 1398 1710-2240  
18-inch sheet train, of steel slabs and  
sheets, 343 1680-2240  
9-inch train, of steel bars, 332 1118-2240

The 16-inch train lost one week, owing to  
repairs on the water supply for the mill.

The various trains at the Albany iron  
works department of the establishment  
made during the month, exclusive of rivets,  
bolts and nuts, railroad spikes, crowbars  
and car axles, of which there was a fair  
product, 3401 1833-2240 tons of merchant  
iron, and during the twenty-four hours of  
October 14th, the 9-inch train in the water  
mill of this department rolled 93,242 pounds  
of ¾ and ¾-inch round iron, but twenty-  
one hours having been consumed in actual  
working. The iron was treated in two  
furnaces.

The steel works, converting shop and  
blooming mill at Troy were the first built  
in this country, and have not so large a  
capacity as some of the later establishments.

But the managers of the Troy Works have  
no need to apologize for their plant with such  
a record as that above given.

The South and Protection.

The stronghold of free trade in this coun-  
try, at least since the days of Calhoun, has  
been in the South. The sentiment of this  
section has been well expressed by its repre-  
sentatives in Congress, and these have been  
largely free traders. From some sections  
Congressmen have been elected who, on  
sugar or similar articles, have been protec-  
tionists, and these have often been com-  
pelled, in order to retain the duties on sugar,  
to vote for protection to other industries,  
but in most cases in the past they have done  
it with a bad grace and under duress.  
This is changing. The South has opened its  
eyes to the fact that perhaps, after all, the  
course of the North in developing its in-  
dustries may not have been a mistake, and that  
they, in their views of the development of  
the South, were the mistaken. A decided  
protectionist sentiment is growing in the  
South, and growing rapidly. Virginia will  
no longer be represented by free traders  
like Mr. Tucker, but at least four, if not  
more, of its representatives are prominent  
protectionists. Col. Robert Beverley, of  
Farquhar County, who is a large farmer, in  
a communication recently made to the  
*Religious Herald*, expresses the sentiment of  
Virginia as follows:

What Virginia wants most is manufactures.  
Never let a ton of iron ore, a foot of timber,  
a pound of wool or cotton or tobacco, or a bushel  
of wheat, leave her borders until it is manufactured,  
and her home people supplied. More people here  
to work these machines, and not send the raw ma-  
terial to Pennsylvania or New England or Old  
England to be manufactured and brought back to  
us, at an enormous rate of freight both ways, and  
from 100 to 500 per cent for manufacturing it.  
Here, where it is produced, it must be manufac-  
tured to bring prosperity. We want protection to  
our State manufactures by State legislation, and  
not talk any more about that old, effete doctrine  
of free trade till we can stand on our legs. I am  
glad to see that Mr. Voorhees, at Atlanta the  
other day, said the South and West wanted pro-  
tection. Georgia has seen it for some time  
past, and is giving it to her people, and  
hence her prosperity. With not half the  
mineral resources or agricultural fertility or tem-  
perate climate that Virginia has, Georgia has  
gone far ahead of us in wealth and prosperity.  
What has made sterile, rock-bound, ice-clad New  
England what she is except protection to her  
manufactures and our raw material? Every day  
now you see our iron ore and timber going from  
Virginia to Pennsylvania and Delaware for man-  
ufacture. Was there ever such suicidal folly? Our  
season has been unpropitious, it is true; but it  
has been equally so all over the United States.  
But the trouble is our people are not making the  
most of their productions and country and cli-  
mate—the finest that God ever gave to man.  
I see an improvement in some sections along all  
the various railroads, in foundries and manufac-  
tories starting, and many new railroads build-  
ing—indicating a great boom of prosperity to  
the old State; but we want these enterprises every-  
where in our borders. Why not manufacture all  
the tobacco, cotton and wool grown in Southside  
and Tidewater Virginia at home? Also, agricul-  
tural implements, horse shoes, &c.—thus build-  
ing up little towns and villages among us, and  
keeping our money at home. Then we could  
stand droughts better, and nobody would want a

political office, and readjusters' occupation would  
be gone; and when Providence smiled on us with  
his next propitious season, we would forget we  
had a drought and a frost in 1881, and would be a  
happier and more prosperous people.

The Richmond Dispatch, one of the ablest  
conservative papers in the South, comments  
on this as follows:

From what we have been able to observe, but  
few men in the South now hold to free-trade doc-  
trines. England's example has amounted to noth-  
ing, so far as the rest of the world is concerned;  
indeed, her own people are getting sick unto death  
of it. The agitation there, under the name of  
"fair trade," indicates how utterly Cobden and  
his fellow prophets have failed in their predic-  
tions. We in the South are just beginning the  
world in manufactures, but the beginning has  
been a good one. We have at hand all the raw  
materials necessary for these manufactures, and  
the country money that used to go into negroes  
is finding its way into the stock of these factories.  
The live men who manage these industries under-  
stand fully the fact that the North cannot fail to  
have the same effect in the South; hence they want  
protective tariff to continue, and laugh to scorn  
the old free-trade notions that used to prevail in  
our section.

We commend these utterances to our Eng-  
lish friends, and all others who think the protec-  
tionist sentiment in this country is on the  
wane.

## Colorado Iron and Steel.

Considerable attention has been excited in  
the West over the reports of the results ob-  
tained at the new steel works of the Colo-  
rado Coal and Iron Company, especially in  
their Bessemer department. The works are  
situated at South Pueblo, Col., and in the  
steel converting works the arrangement of  
the plant is similar to that of the new Pitts-  
burgh Bessemer Steel Company's works, an  
arrangement that has given exceptionally  
good results. The rail-mill plant consists of  
Siemens' heating furnaces and heavy bloom-  
ing and rail trains. The rail mill is 450 x 60  
feet. The daily output of pig is 80 tons  
from one furnace, 65 x 15 feet, which it is  
hoped will be increased to 100 tons. A sec-  
ond furnace is to be built. These works  
have recently been examined by Capt.  
Jones, of the Edgar Thomson Steel Works,  
Mr. Owen F. Leibert, of the Bethlehem Iron  
Company, and Mr. James Hemphill, of  
MacIntosh, Hemphill & Co. The report of  
these gentlemen is somewhat guarded, and  
is based partly on observation and partly on  
the statement of the manager, but the result  
indicates that these works have materials  
both excellent and abundant. These gen-  
tlemen say:

Your Canon and El Moro coals seem to be of  
excellent quality, and so far as we can observe,  
are superior to anything we have about Pitts-  
burgh; and even in the matter of fire-clays, gan-  
ister and manganese ores, you seem to have all  
you could wish, while your limestone is abundant  
and far superior in quality to any in the Pitts-  
burgh district. In our opinion you have the best  
field for the coal, iron and steel industries we  
know of anywhere, and the manner in which your  
works are constructed will enable you to mine  
and manufacture cheaply and well. The figures  
you have given us of cost of manufacture show  
that you can make Bessemer pig iron for about  
\$3 per ton less than it can be made for at Pitts-  
burgh.

If Bessemer pig can be made for \$3 a ton  
less than it can be made for in Pittsburgh,  
Bessemer steel rails should be made at a  
reduction even more than this from Pitts-  
burgh prices, though of this the published  
report of these gentlemen makes no men-  
tion. We understand, however, that \$5  
below the present cost of Bessemer rails at  
Pittsburgh is privately stated to be the cost  
at these Colorado works. The statements  
are certainly surprising, but there seems  
no reason to doubt their accuracy. The  
gentlemen who made them are not likely  
to be mistaken or hoodwinked, and though  
they qualify their assertion by saying "the  
figures you have given us of cost, &c.,"  
they would hardly have given an opinion  
unless reasonably certain that they were cor-  
rect. Their views of the character of the iron  
and coal deposits of Colorado are borne out  
by other investigators. A correspondent of  
the *Commercial Gazette*, Pittsburgh, gives  
some interesting analyses of ores from the  
mines at Placer, in South Arkansas, and in  
the San Luis Valley, all in the southern por-  
tion of the State, and all in direct commu-  
nication with the works by rail. The sub-  
joined analyses exhibit the character of the  
ores:

	Placer, S. Arkansas.	San Luis.
Metallic iron.....	52.2	65.8
Silica.....	32.64	5.78
Phosphorus.....	.051	.015
Lime.....	5.70	.034
Alumina.....	3.6	1.5
Magnesia.....	3.12	.81
Manganese.....	.34	.22
Sulphur.....	Trace.	.014

A moderate estimate places the amount of  
ore that the company has developed at its  
several mines somewhat over 2,000,000 tons.  
Besides these high grade ores there are others  
of inferior grade, which, being mixed with  
mill cinders, will produce grades of pig iron  
suitable for foundry work. Limestone  
is quarried from a ledge 57 feet high,  
within seven miles of the furnace and con-  
nected with it by rail. Ganister and fire-  
clay also are found in abundance. The coke  
used is of a superior quality, nearly or quite  
equal to Connellsville, and works well in  
the furnace. It is brought from the com-  
pany's coking works at El Moro, near the  
New Mexican line, where 250 beehive ovens  
have an output of 300 tons a day. Follow-  
ing is a comparative analysis:

	El Moro.	Connellsville.
Fixed carbon.....	87.47	87.26
Ash.....	10.68	11.99
Sulphur.....	0.85	0.75

This analysis probably was made from  
selected coke, and the output of the ovens  
will not average so high a figure as is here  
given. The coke is, however, of very good  
quality and seems to be particularly well  
adapted to working with the native iron.  
Even better coals are found in other por-  
tions of the State—a coke several per cent.  
better than Connellsville coming from  
Crested Butte, in Gunnison County—and  
the supply of coke and coal is in excess of  
any anticipated requirement. Works pos-  
sessing such conspicuous natural advantages  
ought to be a good property if well managed.  
From all we can learn they have thus far  
been managed rather more liberally than  
wisely. Probably it will not take long to  
reduce the staff of "walking gentlemen"  
who, with various titles, are now attached  
to the staff. Too many engineers are not  
likely to promote the success of a company,  
especially when their retention is attended  
with the double disadvantage of swelling  
the pay-roll and unnecessarily subdividing  
the responsibility.

## The Coming Tariff Conventions.

We question if there has been a time  
within the last fifty years when protection  
was as strong in the popular favor in this  
country as it is to-day. For the first time  
since the days of "Polk, Dallas and the  
Tariff of '42," the campaign of last fall  
turned on the tariff. The verdict then given  
was so emphatic that even some of those  
who fought for "revenue only" have taken  
occasion to place themselves on record as  
protectionists. In the South the tariff sen-  
timent is growing. The doctrines of the  
historical school of political economy inevit-  
ably tend, if not to protection, at least to  
the destruction of the dogma so persistently  
advocated by the disciples of Adam Smith,  
that free trade is, under all circumstances,  
the only trade that is right and justifiable.  
Our educated men who think of political  
economy after leaving college are not, as  
the rule, strongly imbued with the doctrines  
taught in the text books. Many of them,  
when investigating the question thoroughly,  
become protectionists. Not only is the  
theory of protection spreading here, but  
abroad as well. To quote the words of Earl  
Granville in his speech at the Lord Mayor's  
banquet to the Iron and Steel Institute,  
"France and the United States maintain  
their tariffs, and I am not aware of any  
country having made any substantial  
reduction in theirs, while Germany,  
Greece, Italy—enough to bring the illus-  
trious Cavour from his grave—and Russia  
also, have raised their duties on iron  
against this country."

All these facts render it incumbent on  
the protectionists of this country to make no  
mistakes. It has been their success that has  
led to the belief that, after all, the beautiful  
theories of the school of Adam Smith may  
not be true, and that instead of legislating  
for Robinson Crusoe or some imaginary  
economic man who never did and never can  
exist, it is wiser and more justifiable to  
legislate for the John Smiths of the present  
day who live and work in our mills and  
workshops. In this country we have the  
prestige of victory and the power that  
comes with it, and it is incumbent in us  
not to waste the fruits of victory and scat-  
ter our power by using it tyrannically or  
unwisely.

In their relation to the future of pro-  
tection in this country, the two tariff con-  
ventions that are to be held this month are  
of the utmost importance, and it is the  
height of wisdom that their action be  
moderate, sensible and wise. Any demands  
that are immoderate, and any attacks  
on the tariff inspired by purely selfish  
and personal motives, should be guarded  
against; and the conventions, while un-  
compromisingly in favor of protection,  
should not be so extreme as to drive away  
from our ranks those who may not have  
measured up to the full stature of protec-  
tionists. We would especially suggest that  
the Chicago convention should not take any  
such action as is foreshadowed in the fol-  
lowing paragraph, which we quote from the  
call:

1. A demand upon Congress for remedial leg-  
islation, by which the Treasury rulings and court  
decisions against the development and welfare  
of many of our home industries shall be radically  
and completely rectified; and the proper means  
whereby certain unfaithful servants of the people,  
who do not need to be named, in the Treasury  
Department and the Customs service, may be plucked  
up by the roots and sent to the gallows where  
they stand as obstinate and dangerous impedi-  
ments to the growth and prosperity of our man-  
ufactures.

We are as thoroughly convinced as the  
writer of this call can be of the need of the  
remedial legislation demanded, but we are  
not willing to follow him in his uncalled-for  
attacks on the courts and Treasury Depart-  
ment officials. There is still an abiding  
faith in the American people in the integrity  
of our courts, and any attack on them will  
simply be labor lost—and worse, for it will  
injure the one making the attack. Further—  
and we speak advisedly—the attack on the  
Treasury Department, and especially the  
officer evidently meant, is not only unwise  
but unjustifiable. Judge French is regarded  
by many of the strongest protectionists in  
this country as a sound protectionist. It  
should not be forgotten, however, that  
Judge French's personal views or sym-  
pathies have nothing to do with the ques-  
tion of his official duties. He is a judi-  
cial officer, and it is his duty to interpret  
the law as he finds it. This he has done.  
We trust the convention will not make



personal attacks, but will urge the Eaton bill and remedial legislation. Moderation is always wise, but under existing conditions it is absolutely essential to the success of the movement.

### The Annual Meeting of the American Society of Mechanical Engineers.

The American Society of Mechanical Engineers held its annual meeting in this city on the 3d and 4th of the present month. The press of business which most mechanical establishments feel prevented as large an attendance as had been hoped for. It is also possible that the somewhat tardy notice of the meeting which was sent out may have had something to do with it.

The papers presented, though not large in number, were of importance, and their appearance in the transactions will be looked for with much interest. Unfortunately the discussions were necessarily limited, on account of the short time which the society had at its disposal. From the same cause it was out of the question to make any arrangements for excursions or visits to the various points of interest in and around the city. In view of this, it would seem wiser policy in the future to arrange to have the meetings called upon Wednesday, and to commence the sessions upon the morning of that day. This would leave abundant time for the transaction of all business, and also for visits to such points as it may be especially desirable to visit. The next session of the society is to be at Philadelphia, Pa., and as is well known, that city abounds in things of the greatest interest to the profession. In fact, almost as much instruction may be gained from the excursions which could be planned as from the meetings, and time could easily be found for both.

Financially the society is in a most prosperous condition. Its membership is already large and is constantly growing, and the bank account (already a good sum) is rapidly increasing from initiation fees and annual dues. So prosperous, indeed, has the society become that it is hardly too much to hope that, in the near future, it will be able to obtain a permanent location for its offices and collect the nucleus for a library. No small part of the exceptional financial prosperity of the society has been due to the judicious management of the treasurer, Mr. Moore, while the numerical growth may be traced in no small degree to the influence of the president, Professor Thurston, and the activity of the members themselves.

Though strong and growing, the society, we think, is not without its dangers. The business activity of the present year has prevented it from accomplishing, in its last meetings, as much as was to have been expected, and we fear that, unless very active means are taken to insure an abundance of papers at the Philadelphia meeting, a most depressing dearth will be found. It is not sufficient to say that men are too busy to write. Men are always too busy to contribute to the transactions of a society unless they can benefit themselves by so doing. If a paper communicated to a society will aid in bringing a man before the public and giving him a reputation, both among his professional rivals and among those who are in need of his services, he will always find time to write papers. A man's life-work tends toward his advancement, and no man, in these days of pushing enterprise, is willing to acknowledge that he is too busy to get on in life, or to use the means by which the most rapid advancement is to be attained.

The returns of the British Board of Trade for September are of considerable interest in their relations to this country. The total increase in the exports of iron and steel for the month of September, 1881, as compared with September, 1880, was 79,504 tons, or 26.7 per cent. To the United States alone the excess was 45,000 tons. The returns for the nine months ending September 30, 1881, are not, however, so favorable. The decrease in exports to this country for the nine months of 1881, as compared with the nine months of 1880, is 306,354 tons, or more than 25 per cent. The table, however, shows that nearly one-third of all the iron and steel that Great Britain exports comes to this country. In special lines the exports to the United States of bar, angle, bolt and rod iron, show a heavy falling off for September, 1881, as compared with September, 1880. The exports of steel rails are very heavy. Hoops, sheets and plates have increased, and unwrought steel increased 51,664 tons the first nine months of 1880 to 110,307 tons during the same period in 1881. It is interesting to note, in regard to steel rails, that the *Iron and Coal Trades Review* states that if it was not for the demand in this country, one small mill, turning out 600 tons a week, would supply the whole export demand.

The failure of the negotiations for a commercial treaty between France and England is again announced. We have had no idea from the first that these negotiations would be successful. As we have stated in these columns, it was the negotiation of this treaty in 1860 that was the beginning of the downfall of Louis Napoleon. It was as the result of its conclusion that for the first time in his reign a large class became united in its opposition to him. This class still exists and still believes that the treaty was wrong and injurious to France, and this class is now the ruling power. The future will depend

somewhat on the policy Gambetta may follow, but he will hardly dare yield some of the points in controversy which are avowedly urged by the English commissioners in the interest of their manufacturers and workmen, and which must injure the French as it benefits the English. Take cotton, for example. The English demand a reduction of the conventional duty on cottons. The French cotton manufacturing interest is unanimously opposed to any such concession, and it may be assumed that no government in France is strong enough to grant it. The only free trade that France is insisting upon at the present is the removal of the restriction on the importation of American pork.

The statistical position of the English iron market has an interest and importance for the trade in this country which has been thoroughly appreciated during the past two or three years, but which, under conditions favorably affecting the domestic market, are likely to be overlooked. The latest statistics of the production and stocks of Scotch and Middleboro' pig are as follows:

	Scotch.	Cleveland.
Stock Jan. 1.—	Tons.	Tons.
Public stores.....	495,850	183,380
Makers' brands.....	243,150	147,735
Total.....	739,000	331,115
Production Jan. 1 to Sept. 30.....	941,800	2,028,380
Supply for nine months.....	1,680,800	2,459,495
Consumption and exports.....	739,534	1,626,083
Stock Oct. 1.....	925,260	433,427
Increase since Jan. 1.....	183,260	102,307

The apparent overproduction in these two districts is thus 285,569 tons, or somewhat less than 10 per cent. During the first six months the excess was about 13 per cent, and during the last three months only 3 per cent. The fact that the percentage of overproduction for the nine months ended with September was relatively less than for the first six months of the year, is because the average monthly production during the first half of the year was nearly 7500 tons greater than the monthly average for the third quarter, while the monthly average of consumption and exports for the third quarter exceeded by 25,300 tons those for the first six months. If the agreement to reduce production 12½ per cent. can be carried out, a considerable reduction in stocks may be expected, unless the demand falls off or the production of other districts is proportionately increased. In view of all the facts, the statistical position of the British iron market may be said to be improving, but not to such an extent as to warrant a speculative movement to run prices up in this country.

As we announced last week, the strike in the iron mills of Cincinnati is at an end, but according to the *Cincinnati Commercial*, a new speck of war is appearing. The *Commercial* claims that the manufacturers understand that "the term 'Pittsburgh prices' applied to the prices paid at the Smoky City when the agreement was entered into. Such, however, was not, it is said, the intention of the workmen. Their agreement, as stated by one or two of their number last night to a *Commercial* reporter, was that after June 1 they would accept the Pittsburgh scale, but they proposed to make that scale to suit themselves, and proposed to hold the bosses to it. It was not the scale of to-day that they were looking to, but the scale which would be operative on June 1, 1882." We are inclined to doubt the first statement. All that the Cincinnati mills were fighting for were Pittsburgh prices, whatever they may be; and whatever the conference at Pittsburgh may agree upon next June as the rates that shall be paid at Pittsburgh will be, according to the agreement, the prices that will be paid in Cincinnati. In other words, the scale in the Pittsburgh district and the Cincinnati district will be the same. We presume that the Cincinnati workmen and the Pittsburgh workmen will present the same scale of prices. Then, on the other hand, we do not believe that the Cincinnati workmen will prevail upon the Pittsburgh workmen to advance the scale. The scale will, no doubt, be one that will suit the workmen, or, at least, the one adopted by them, but there will be no material advance over the present one. We will venture the prediction that boiling on a \$2.50 card will remain at \$5.50, and other wages now covered by the scale will remain as they are.

Pittsburgh, or rather Allegheny County, has about settled the bill of damages imposed upon her by the now famous riots of 1877. The number of separate claims settled has been 1957. The amount paid has been \$2,751,465.87. The face of the claims settled was \$3,574,488.82. This is rather an expensive luxury; but if the lesson it teaches is learned it will be cheap.

A meeting of the committee of the Franklin Institute to report upon fire escapes was held in Philadelphia recently, at which a number of models were exhibited. The committee, which appeared from the remarks of the members to favor incombustible stairways more than outside ladders, invited the Councils Committee to meet them at its next session, when a report is to be prepared.

The first line of telegraph was erected less than 40 years ago, and at the present time there are more than 1,000,000 miles in operation. The United States comes first with 250,000 miles, with the immediate probability of adding another 100,000 miles; Germany comes next, with 150,000 miles, and the great Chinese empire last, with 1200 miles.

## THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

Annual Meeting Held in New York, November 3 and 4, 1881.

The second annual meeting of the American Society of Mechanical Engineers was called to order by President R. H. Thurston in the Theater of the Turf Club. The presentation of the reports of the officers was first called for. The secretary, Mr. Rae, read a report upon the condition of the society, which was of the most favorable character. Last year the number of members amounted to 181; at the present time the list comprises 297 names. The society has organized very extensive exchanges of publications with most of the foreign societies. There have been arrangements made by which delays in publication of papers, &c., will in the future be avoided, and a copy of diploma has been adopted, and a copy was shown in the ante-room. Badges for members had also been prepared and were ready for distribution. Cards of introduction for members had also been prepared; these are of the nature of a certificate of membership, and were an introduction as well. Many offers of books for a library had been received, but had been declined because it was impossible to find storage for them. The present property of the society has no convenient place of disposal. It is to be hoped that at some time in the immediate future there will be an effort made to secure permanent quarters.

The president then spoke of the steps that had been taken to incorporate the society, and the desirability of doing so. At the present time the society is irresponsible, and will be until it is incorporated. Until that time the members are personally responsible for its debts.

Mr. Rae called attention to the fact that one of the rules was not in accordance with the statute, five members not being a majority of the council, and at present these are empowered to act.

After some discussion, Mr. Porter decided the whole matter by saying that the statute would take the place of the rule, and no action on the part of the society was necessary in regard to it.

Mr. Bayles's motion to amend rule 40 was then called for and the rule and proposed amendment read. A great many objections to the amendment were made by various members, who contended that they wished to have control of their papers and decide in what journals they should be printed after being read before the society.

Mr. Woodbury objected to the clause in regard to printing by saying that the papers were contributed by busy men who could not always find time to prepare them, and they could not be put in type in season.

Mr. Bailey thought if the papers were distributed to the press some journal would print them all, and then no reputable paper would care for them.

It was said that members do not care to see their work in any and every newspaper, preferring a smaller, but more select circle of readers.

It was urged against these statements that there was no difficulty in putting any paper in type in 24 hours, and that the rules already required this. These points were given little weight by Prof. Sweet, Mr. Bailey and Mr. Moore, of the *American Machinist*, and several others. The general feeling manifested by the speakers opposed to the motion was that it was not at all desirable to put the proceedings freely into the hands of the press for general publication. The motion was put to vote and was lost.

Mr. Bayles at once gave notice that he would move the same amendment to the rules at the next annual meeting.

Mr. Charles T. Porter read a paper on A NEW METHOD OF KEEPING MECHANICAL DRAWINGS.

The paper detailed at length the system of keeping and classifying drawings adopted by the Southwark Foundry and machine Co., of Philadelphia. In this system they had abandoned what may be called the natural method, or that which has for its idea the classification of drawings according to subject matter, and keeping those of the same machine or of the same parts together in drawers or portfolios. In practice it is necessary to make drawings of greatly varying sizes, and where the large and the small are put together the smaller ones are difficult to find and are likely to be lost or injured. Abandoning entirely the idea of classification according to subject, it was determined to arrange them according to size, of which there are 9 which are lettered, the largest being the antiquarian sheet, which is 51 by 30 inches, and the smaller ones cut from it so as not to occasion waste. Each size is lettered. They are as follows:

A.....17" x 30" D.....17" x 30" G.....17" x 15"  
B.....17" x 30" E.....12½" x 30" H.....8½" x 15"  
C.....25" x 30" F.....8½" x 30" I.....14" x 25"

Drawers are made to hold each size. Different drawers of the same size are distinguished by numerals as well as letters. The "blue process" revolutionized the drawing office at the Southwark Foundry, and now all the drawing studies are left in pencil. When nothing is found to alter, the cloth tracings are made. A separate drawing is made for each piece. The originals are kept in a fire-proof vault. The combined drawing is not inked in, but the details are picked out from it. The drawers hold 50 tracings, and the drawings are marked with stencils on the lower right-hand corners, and with an inverted plate on the upper left-hand corner. Fifty is the highest number to be found in any drawer. Indexes are used to find what is wanted. Each tracing as it is completed is placed upon a numerical index, and is given a consecutive number. From this index the title and number are copied into other indexes under as many headings as possible. The foremen make their orders by the stencil numbers, and the patterns are marked in the same way. The sole business of the works being the manufacture of steam engines, enables printed lists to be made of all the separate pieces constituting an engine, and these classified lists are found very useful. One person

only is allowed to put away the sheets, and to this one is assigned the work of writing up the indexes.

After the reading of the paper the treasurer's report was called for. It was given in detail. As some curiosity has been expressed as to the funds collected and the disposal which has been made of them, we give this report in full. It will be observed that the latter portion gives all the disbursements since the organization. The amount of money to the credit of the society at the present time is rather more than \$3000.

### TREASURER'S REPORT.

66 Fulton street, New York, November 3, 1881.

To the Society.—Since my report presented at the Altona meeting I have received funds as follows:

Initiation fees.....	\$345.00
Annual dues.....	191.00
Life membership.....	150.00
October interest on bonds in Safe Deposit Vault.....	20.00
Total.....	\$706.00

Since the same report I have expended, to pay bills audited by the Finance Committee, as follows:

Printing and stationery account.....	\$68.35
General expense account.....	177.71
Postage account.....	58.56
Salary account.....	298.18
Traveling account.....	3.85
Total expenditures.....	\$508.65

Being a net gain to the treasury of \$197.35 since last report. There is still due the society, from the membership, initiation fees and annual dues amounting to \$190. By way of general summary embracing this, together with the three previous reports which I have had the honor to make to the society, I will state that, during my term of office just closed, I have received, from all sources, cash as follows:

Initiation fees.....	\$1,090.00
Annual dues.....	2,368.00
Life membership.....	450.00
Sale of papers to members.....	20.18
Profit on \$600 U. S. bonds sold to meet expenses.....	17.25
Interest on same, 6 months.....	6.00
Interest on \$2000 U. S. bonds in Safe Deposit Vault, 6 months.....	40.00
Making the total cash receipts.....	\$4,991.43

During the same term of office I have expended, to pay bills approved by the society and audited by the finance committee, funds distributed under the following heads:

Engraving account.....	\$26.95
Traveling account, secretary's expenses.....	18.03
General expense account, including the following prominent items, viz.: Rent of hall, \$20; hotel headquarters, \$30; stenographer's fees, three meetings, \$25.40; carpenter's bill for boxes, &c., \$46.11; blackboards, crayons, &c., \$26.65; omnibus hire, \$6; in all.....	727.49
Salary account, the items being: Clerk hire in March, 1880, \$11.75; one year's salary of secretary, \$120; copying and draughtsman's pay in secretary's office, \$48.58; total.....	1,562.33
Printing and stationery account, including bill for printing papers read in November, 1880, amounting to \$67.50; in all.....	1,166.34
Postage account.....	178.81
Making total expenditure to date.....	\$3,749.81
And leaving cash on hand.....	\$1,241.62

In bank.....	\$64.08
Cost price of \$2,000 U. S. 4 per cent bonds, in Safe Deposit Vault (now worth about \$45 more than here valued).....	5,277.50
Total cash on hand.....	\$5,341.58

All bills, duly audited by the finance committee and presented to me, have been promptly paid. As above shown, I have kept a liberal deposit lying idle in bank for some months, in readiness to pay bills for printing the transactions of the meetings held at Hartford and Altona six and three months ago, respectively, but am, as yet, unadvised as to when funds will be called for for that purpose.

Respectfully submitted,  
LYCOURG B. MOORE, Treasurer.

Mr. Hutton then moved that a vote of thanks be tendered to the treasurer for the able manner in which the duties of his office had been performed. The motion was adopted.

Mr. Moore then made a short address to the society, in which he spoke of the abundant duties of the office, the criticisms which had been made, and then tendered his resignation. There followed a long discussion, in which members repeatedly expressed their wish to have him retain the office, and asserted their entire confidence in his management of the moneys intrusted to him. When the matter came to a vote, the resignation was refused by a vote which was unanimous.

The evening session was opened by the reading of the annual address of the president, of which we print a very full abstract upon another page. It was of most unusual interest, and we very much regret that we cannot print the entire address. Its great length, however, prevents us from doing so. Mr. Woodbury then read a paper upon the construction of mill floors, which we hope to publish at some future time.

Prof. Trowbridge wished to know whether the vibrations increased the cost of production, injured the quality of the work, or destroyed the mill itself. He then mentioned the fact that New Haven was shaken for three days after the completion of a mill dam some 70 miles away. This was the dam at Birmingham. It was some 300 feet long.

Mr. Woodbury remarked that it was difficult to answer questions of this kind. The injury to the product is secondary matter, or at least the effect upon the product is brought about indirectly. The vibration makes the machinery wear out rapidly, and the machine begins to injure the product long before it is worn out. A great deal of power is wasted when the whole building is in motion bending backward and forward.

The morning session of the 4th was opened by the president, who announced a list of places of interest which the society had been invited to visit, many of which were of unusual interest.

Mr. Root then read a paper, by invitation, upon "Screw Propulsion." This paper presented some features of a novel plan of using the screw for propelling vessels. Briefly, the plan was to incline the screw downward at an angle of 60 degrees, and by acting upon the water in a downward direction to get less slip. The screw had the

very important advantage of working in solid water. A very animated discussion followed the reading, in which a number of gentlemen took part. The paper was found fault with for a great variety of things, and Mr. Root was criticised for not omitting the theoretical portion and giving the data in regard to a boat which he has had running for some time, driven by a propeller arranged in the manner he indicated in his paper. At the next session of the society, which was held in the afternoon, it was announced that the council had concluded to omit the paper from the transactions. This was followed by a long and warm debate on the propriety of such action, and the society, when the matter came up for decision, voted to have the paper appear as a part of its transactions.

It was announced upon counting the votes that the entire ticket as nominated had been elected. Prof. Robinson was called upon for a paper which he had promised, upon "Observations on the Railways of Ohio."

The paper had not been completed, and was delivered from notes. It consisted of a mass of information gleaned during personal inspection of the roads while performing State inspection. The system and management of the roads in the State are past all finding out, and is apparently the result of combinations of capital rather than anything pertaining to the system itself. In general, the East and West roads of the State pay much better than those going North and South. The inspector who would be intelligent must give careful attention to the conditions prevailing, or very serious mistakes are likely to be made. Even engineers are liable to error in a new country before the conditions are known. As an example of how careful investigation was necessary, the speaker mentioned a case where he found an expensive iron bridge of 100 feet span only 6 feet clear of the ground, and at one end an insignificant runlet of water. Investigation, however, showed that at high water the width was absolutely essential, no increase of depth was possible, and the quantity of water flowing down was great. The railway inspection was itself very thorough, and the roads combined with the State to make it as perfect as possible. The speaker took up a multitude of details connected with railways and spoke of the advantages which had followed the system of State inspection. Among other advantages was that in several cases accidents had, in all probability, been prevented. In many cases it was almost demonstrable that accidents would have followed had not inspection called attention to causes that would bring them about. The tendencies in bridge construction were discussed at some length. Tracks were spoken of and the modern systems of rails, ballasting and alignment described.

The afternoon session was opened by the discussion in regard to Mr. Root's paper which we have already mentioned.

Mr. Woodbury's paper on the Fire-Protection of Mills was presented and was distributed to the members before reading. After a considerable portion had been read it was voted to omit the reading of the remainder.

Mr. Partridge presented to the society an outline of the work he had undertaken in connection with the subject of Weights and Measures. He had been collecting information in regard to those in common use, and found that they were in no sense standard. The trouble was not so much with the measures themselves as with the makers and the users. The grain is the common unit, and to this denomination all our weights and measures may be reduced. Some note was made of the historical facts which lead us to believe that the fathom or its half, the yard, was the original standard the world over. The proper method of using the standard measures for scaling, and some experiments made by the courtesy of Messrs. Fairbanks & Co. in regard to the best methods of originating measures from weights, were detailed. A method was given, illustrated by tables, for testing values by means of blocks of wood of known size. The fact that the various measures, as "liquid" and "dry," have different sizes, was shown to be a necessity arising from the difference in specific gravity. No system of weights and measures could escape from this.

Mr. W. Barnett Le Van read a paper on the "Life of Steam Boilers," in which he took the ground that the age of a boiler should be limited, and that whenever that life had been reached or exceeded, the boiler should be replaced. This was the safest course to follow, for, though it might not be strictly applicable in all cases, it would cover a very large majority, and would certainly prevent a class of explosions which unfortunately is becoming very large.

The discussion that followed was of considerable length and many members took part in it. The numerous cases cited of old and thin boilers which were worked at high pressures, sufficiently proved that the rule is one that would do little harm, and might do much good in weeding them out.

Prof. Trowbridge presented a resolution tendering a vote of thanks to C. H. Delamater & Co., J. H. Finch, Major John Newton, New York and Brooklyn Bridge Co., Commander Geo. H. Cooper, U. S. N., T. F. Rowland, W. K. Hain, Esq., and the New York Cold Storage Warehouse Co., for invitations to visit their works, &c. The resolution was adopted, and the secretary was directed to send copies of the resolutions to each of the parties named. A vote of thanks was also extended to the American Society of Civil Engineers for kind favors.

A gentleman exhibited a sample of a most villainously-made emery wheel which he had taken from the stock of a dealer, and he said he thought it would do something toward explaining why such wheels frequently burst.

Mr. H. F. J. Porter presented a short paper on "A Self-Packing Valve." It might perhaps be more correctly styled a self-packing valve stem. It is intended for ordinary stop valves of all kinds. The stem is in two parts. At the point where they are connected it is enlarged into a globular form. A feather, after the manner of an ordinary clutch, crossing the center of the division, transmits the motion, while a spring within



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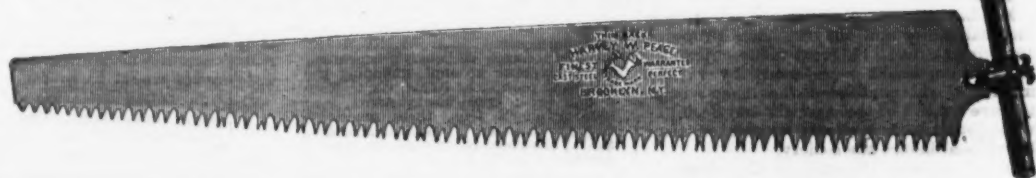
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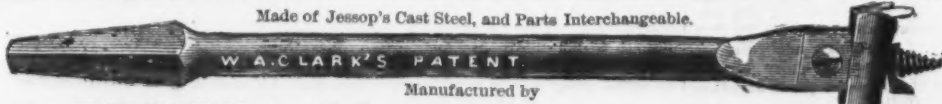
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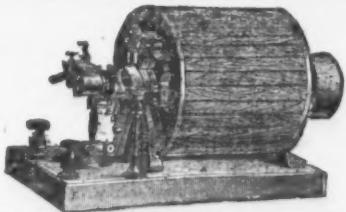


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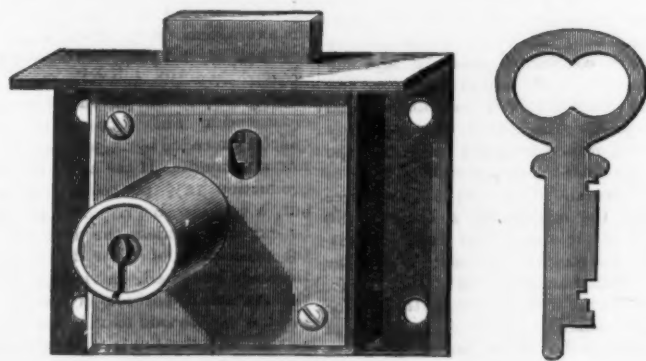
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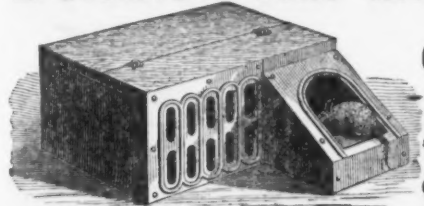
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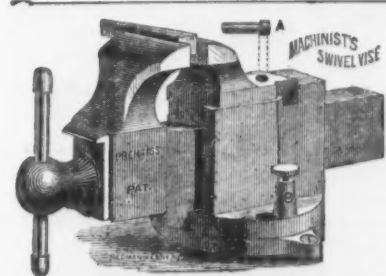
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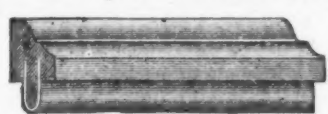
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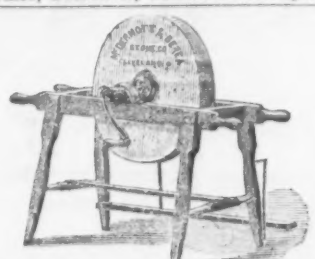
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the globular portion, which is hollow, forces  
 the two parts against globular seats.

Some little discussion followed the paper.  
 Some objected to the use of a stop valve  
 with a fixed stem for fire purposes, and  
 quoted Mr. Woodbury's objections to them;  
 others considered this of little moment. It  
 was a disadvantage that gas stops were  
 made with left-hand screws, and the motion  
 to open was the reverse of that usually  
 necessary. For steam work, the entire  
 freedom of the valve from drip or leakage  
 was valuable. The valve has been in use for  
 some two years at the Lehigh Zinc Works,  
 and had performed admirably.

At the close of the discussion the society  
 adjourned, to meet at Philadelphia, Pa., in  
 April, 1882.

### The Origin of Telegraphy.

From early times some mode of rapidly  
 conveying information from place to place  
 has been anxiously sought for, and many  
 different schemes have been proposed. At  
 first the human voice was employed, and the  
 message passed on from mouth to mouth.  
 It was, however, soon found that signals  
 might be seen at a distance to which the  
 voice could never reach. Some simple signals  
 were usually agreed upon beforehand, and  
 transmitted by means of motions of the  
 hand or by a bright light.

One of the earliest practical uses of this  
 was in announcing to the inhabitants of  
 Palestine in ancient times the appearance of  
 the new moon, by which their festivals were  
 regulated. After it had been seen and in-  
 formation of the fact conveyed to the San-  
 hedrim by trustworthy witnesses, the news  
 was telegraphed over all the land by fire  
 signals. A party of men would ascend a  
 hill outside of Jerusalem and kindle there a  
 large fire of wood, pitch and other inflam-  
 mable materials. As soon as this was seen  
 the neighboring hills copied the example,  
 and thus in a short time the news was  
 conveyed throughout the country. By this  
 plan only a few simple messages could be  
 conveyed. A great advance was made on  
 it many centuries later by the use of sema-  
 phores, or arms somewhat like railway  
 signals. An arbitrary code was arranged by  
 which words might be spelled out and mes-  
 sages sent by these. The stations were at a  
 considerable distance apart, and at each were  
 placed two men, one of whom, by means of  
 a telescope, read the signals, while the other  
 retransmitted them. The process was, how-  
 ever, very slow and uncertain, as there was  
 no means of calling attention to the fact of a  
 message coming, and a slight fog served at  
 once to interrupt all communication. A  
 telegraph worked in this way was, however,  
 erected between London and Dover, in Eng-  
 land, and continued in operation some little  
 time.

Soon after the discovery of the more sim-  
 ple phenomena of frictional electricity, at-  
 tempts were made to convey communication  
 by means of it. As early as 1727 the  
 electrical excitement was conveyed a dis-  
 tance of several hundred feet by means of  
 a wire suspended by silk threads. An ex-  
 cited glass cylinder was applied to one end,  
 and it was found that particles of paper or  
 other light substances were attracted at the  
 other extremity of the wire. About 25  
 years later a letter appeared in the *Scott's*  
*Magazine*, suggesting a means of communi-  
 cating with a friend at a distance by means  
 of electricity. A number of wires, one for  
 each letter of the alphabet, were to be taken,  
 and supported by some non-conducting ele-  
 ment. The excited barrel, or cylinder, or, as  
 we should now call it, the prime conductor,  
 was to be placed at right angles to these  
 wires, and at the end of each was to be a  
 metal spring, which might be made to touch  
 the conductor. At the other extremity small  
 balls were to be arranged, marked with the  
 letters of the alphabet, and under each, at a  
 trifling distance, small pieces of paper were  
 to be placed. When a word or message was  
 to be sent, the spring marked with the first  
 letter of it was pressed by means of a glass  
 rod against the conductor; the wire then  
 would at once become charged with elec-  
 tricity and attract the fragment of paper at  
 the further end, indicating thereby the let-  
 ter sent. The next letter would be sent in  
 a similar way, and so the whole message  
 was spelled out. The scheme unfolded in  
 the letter seems to be the first germ of the  
 telegraph, but so many improvements and  
 alterations have been made by different men  
 that there is no one in particular to whom  
 we can point as its inventor.

The first electric telegraph ever actually  
 erected by which intelligible signals could  
 be transmitted, was constructed at Geneva,  
 Switzerland, by Lesage, and was somewhat  
 on the principle of that described in the let-  
 ter referred to above. Twenty-four wires  
 were employed, and from the further end of  
 each a small pith ball was suspended; as  
 soon as any wire was excited by being  
 brought into contact with the conductor,  
 the balls would immediately diverge. Vari-  
 ous other attempts were made to construct  
 telegraphs to act by means of frictional  
 electricity, and several important improve-  
 ments were made, but none were ever  
 brought into practical operation. About the  
 beginning of the present century several  
 facts were discovered in connection with  
 voltaic electricity, and attention was soon  
 turned to that as a mode of transmitting  
 signals. A telegraph was constructed by  
 Somerling, at Munich, Bavaria, in 1808,  
 which was worked by a "voltaic pile," and  
 in which the messages were received by the  
 decomposition of water by the current. The  
 wires terminated in gold points, placed side  
 by side in a trough of water, and lettered.  
 When the current was sent along any wire  
 minute bubbles of gas were evolved at the  
 gold point and indicated the letter. The  
 discovery by Oersted, in 1820, that a mag-  
 netic needle was deflected from its position  
 by an electric current passing along a wire  
 near it, constituted a red-letter day in the  
 science of telegraphy; and the discoveries  
 of Faraday, a few years subsequently, as to  
 the phenomena of induced currents, greatly  
 aided in bringing the science to the degree  
 of perfection it has now attained.

Galvanometers were soon constructed for  
 the purpose of receiving the messages, and  
 a powerful bar magnet was frequently used  
 to induce the current.  
 The great drawback in the early forms

had been the number of wires required,  
 which added very greatly to the cost, and  
 to the difficulty of maintaining the apparatus  
 in working order. These have been gradually  
 reduced in number, till now the great ma-  
 jority of instruments require only a single  
 one, and over that, by the aid of the most  
 recent inventions, several messages may be  
 sent at once, and in opposite directions. At  
 first a "return wire" was always employed  
 to complete the circuit. Steinheil, however,  
 in experimenting with a view of ascertain-  
 ing whether the metals of a railroad could  
 be used as conductors, made the important  
 discovery that the earth itself would serve  
 the purpose of a return wire. Since then a  
 separate wire is always dispensed with, and  
 a metal plate is buried in the earth near  
 each telegraph station, the return wire being  
 connected to it.

The first experimental application of elec-  
 tric telegraphy was made by Mr. Cooke, on  
 the Liverpool and Manchester Railway, in  
 1837, and he and Prof. Wheatstone, to whom  
 he was then introduced, afterward elab-  
 orated the present system of telegraphy now  
 in general use in Great Britain. Prof. Morse  
 is the inventor of the system which bears his  
 name, and his is the system adopted in the  
 United States and Canada.

### Schools to Train Mechanics.

The *Philadelphia Ledger* says: Commis-  
 sioner Eliot C. Jewett's report on the man-  
 ual training school of Europe, whose prod-  
 ucts were exhibited at the Paris Exhibition  
 of 1878, shows that Russia and France are  
 giving the most attention to this subject.  
 The technological schools of Russia receive  
 most liberal support from the government,  
 and are managed very much like military  
 schools, only that the pupils learn to become  
 civil or mechanical engineers, or skilled  
 workmen and foremen in construction shops.  
 Russia has also technical schools and work-  
 shops less ambitious than those at St. Peters-  
 burg, where pupils pay nominal fees for  
 instruction, about \$15 per annum for those  
 who do not board at the institutions. All  
 of these schools are well equipped with  
 machinery, the instruction appears to be  
 thorough, and graduates find no difficulty in  
 obtaining situations as foremen of other  
 workshops. The French schools, like those  
 of Worcester, Massachusetts, manufacture  
 articles for sale, and those of Switzerland  
 are devoted, almost exclusively, to watch-  
 making. Austria has 80 schools for indus-  
 trial training, with about 4000 pupils, but  
 no information is given as to how they are  
 managed. In some of these schools instruc-  
 tion is given at night, the pupils being  
 employed at other work during the day.  
 This is the nearest approach in any of the  
 foreign schools to the experiment in indus-  
 trial training now being tried by the Spring  
 Garden Institute of this city. For two years  
 instruction has been given in fitting to small  
 classes, with such good results that this year  
 a complete machine shop, on a small scale, is  
 to be opened, and instruction given to a  
 larger class of pupils in every branch,  
 except casting, of mechanical work in  
 metals, and possibly in wood. It is not sup-  
 posed that such schools can take the place  
 of the workshop for training mechanics, but  
 that, under present conditions of doing  
 work mainly by machine tools, the appren-  
 tice attending the school can more readily  
 acquire skill in the handling of tools and a  
 broad general knowledge of mechanical  
 operations.

At the last examination before the Com-  
 missioners of the Broadway Underground  
 Railway, Mr. Towle, Chief Engineer of the  
 Bureau of Sewers, testified that in his judg-  
 ment the proposed tunnel could be built  
 without detriment to the sewerage of the  
 lower part of the city. A temporary sub-  
 stitute would have to be made for the main  
 sewer, and it was understood that iron pipes  
 suspended in chains would be used for this  
 purpose. The plans submitted on behalf of  
 the company, so far as concerns the disposi-  
 tion of the water and gas pipes, appeared to  
 be indefinite and not altogether satisfactory.  
 There is evidently need of caution in arrang-  
 ing these details, in case the main proposi-  
 tion should be approved; otherwise, the  
 work of construction may entail grave con-  
 sequences not only to owners of property in  
 Broadway, but to all frequenting that thor-  
 oughfare.

Messrs. Taws & Hartman have furnished  
 the following particulars of six weeks'  
 work by the Durham Furnace, at Riegels-  
 ville, Pa., under the management of B. F.  
 Fackenthal, Jr.: Height of furnace, 75  
 feet; width of bosh, 20 feet; average fuel  
 used to the gross ton of pig iron made, 2677  
 pounds (one-eighth coke and seven-eighths  
 anthracite); average per cent. of carbon in  
 fuel, 87; average ore used to the gross ton  
 of pig iron made, 4212 pounds; average  
 limestone used to the gross ton of pig iron  
 made, 2309 pounds; quality of pig iron  
 made, Nos. 2 and 3; average heat of blast,  
 765 degrees; average weekly make of pig  
 iron, 527 gross tons.

The *Railroad Gazette* says the projectors  
 of some of the new railroads now under way  
 would do well to consider the remarks made  
 some years ago by a stockholder in a Con-  
 necticut road. "You see," he said, "we  
 knew you could not go from L— to D— with-  
 out riding all around the country, and chang-  
 ing cars three or four times. We made up  
 our minds to build a road straight across  
 country, so we chipped in and built it, and  
 then, by gosh! we found out that nobody  
 ever did want to go from L— to D—. And  
 then—we busted."

At the iron works of Hewes & Phillips,  
 Newark, N. J., one day recently, 9½ tons  
 of iron were melted in 40 minutes. They  
 run a 4½-foot cupola and use Connellsville  
 coke.

Ancient Egyptians who died 2000 years  
 ago are now being converted into paint;  
 they make very superior burnt sienna, which  
 London painters are willing to pay a good  
 price for.



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SOLE MANUFACTURERS OF



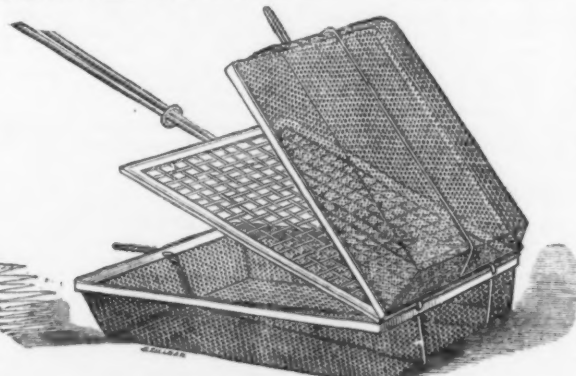
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These goods are sold by all leading jobbers in General and Saddlery Hardware at manufacturers' prices.  
Send for illustrated catalogue and price list.

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### DOUBLE REVERSIBLE CORN POPPER.

OUTSELLS  
ALL  
OTHERS.  
—  
Close  
Prices  
TO  
Jobbers.



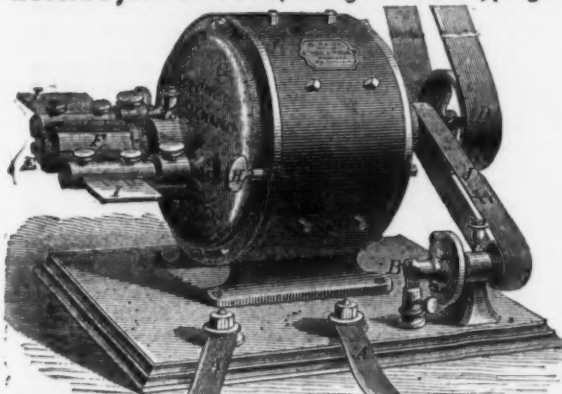
Double  
The Size  
OF  
Common  
Poppers.  
—  
Retail  
FOR  
25 Cents.

Wood Patent, April 14, 1874.

Made of Plated Wire. Durable and Handsome.

BROMWELL MANUFACTURING CO., Sole Makers, Cincinnati.  
Agents: W. H. QUINN & CO., 79 Chambers Street, New York.

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For Nickel, Bronze, Brass, Copper and Silver Plating.  
Over 1000 machines in use.  
Are used by all leading stove manufacturers.  
Experienced men sent to put up machines and instruct purchasers.

INFRINGEMENTS.  
We call attention to infringements of the Weston Machine in which Automatic Switches are used to prevent change of current. The Weston Co. are owners by grant or purchase of all forms of Automatic Switches for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

MANUFACTURERS OF  
Cast Nickel Anodes, Pure Nickel Salts, Polishing Materials.

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**GENUINE BABBITT,** Guaranteed at a speed of 10,000 a minute, and at any pressure for 10 years.  
Office JAMES BUTTERWORTH & SON, Manufacturers of Wooden Machinery, 252, 254 and 256 E. Adams St., PHILADELPHIA, October 17, 1881.  
PHILADELPHIA SMELTING COMPANY.—GENTLEMEN: We have been running your "Genuine Babbitt" on our wood drilling machine for the last eight years at a speed of 9000 revolutions per minute, with out renewal. We have found it to be the best metal we ever used.  
Yours truly,  
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PHILADELPHIA SMELTING COMPANY, City.—GENTLEMEN: After a trial of eighteen months of your "Deoxidized Bronze" as journal boxes in our rolling mill, where great pressure is required, we take pleasure in recommending it as being superior to any we have heretofore used.  
Very truly,  
HENRY DISTON & SONS.

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### Horse, Mule & Snow Shoes of the Perkins Pattern.

Works at Valley Falls, R. I. Office, 31 Exchange Place, Providence, R. I.

F. W. CARPENTER, President. C. H. PERKINS, Gen'l Manager. E. W. COMSTOCK, Secretary

## JACK SCREWS,

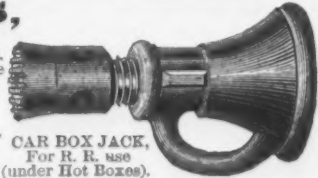
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Cast with Perfect Seamless Thread by our new patent process.  
Cheaper than Wrought Iron, not so apt to bend or strip the thread. Liberal discount to the trade.

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Best in the market.  
Made any size required.  
Combines the properties of a Scraper and Brush.  
Full stock always on hand.

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## BELLAIRE NAIL WORKS, PIC IRON AND NAILS,

Manufacture the Celebrated Brand of

## BELLAIRE NAILS,

Office and Works, Bellaire, Ohio.

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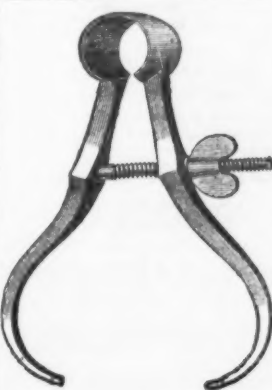
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We invite the attention of RAILROAD MEN especially to our make of SPLICE BARS and Track Bolts. Using the best brands of REFINED IRON, and paying close attention to the finish of our manufactures, we are enabled to offer our patrons BOLTS, NUTS, SPLICE BARS, &c., of excellent quality. Our works have been enlarged within a few years; all orders are now executed with promptness; all our work guaranteed.

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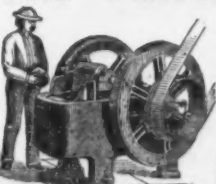
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Twenty years of practical test at Home and Abroad, has proven this machine to be the best one ever invented for the purpose. Mr. S. L. HANSEN, for the past fifteen years connected with the manufacture of these machines, has charge of this department of our works, and will personally superintend their erection within a reasonable limit. Chilled Rolls and Rolling Mill Machinery, Power Presses, single and double acting; also, Hammers, Drops and Lifters; Shaking, Pulleys and Hangers.  
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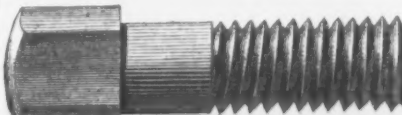
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Is designed to be attached to any Barrel or Cask, thereby converting the same into a temporary Tank, fitted with an effective Pump, and while protecting contents from dirt and waste, the owner has entire control of same, by simply locking the cover.  
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It is as compact in form as is consistent with perfect efficiency, and we feel confident that a trial will demonstrate its practical value.

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Who buys in bulk any of the various kinds of Oils, or in fact any Fluid that can be Pumped;

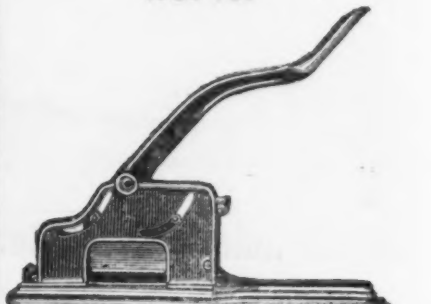
Every Mill, Factory, or Work-Shop, where Oils or other fluids are used, and every store where such fluids are retailed, will find the "CLIMAX" just what they require.

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## The Iron-Masters' LABORATORY.

Exclusively for the

Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags and Coal for Practical Metallurgical Purposes.

No. 339 Walnut St., Philadelphia.  
With Branch at Warrenton, Virginia,  
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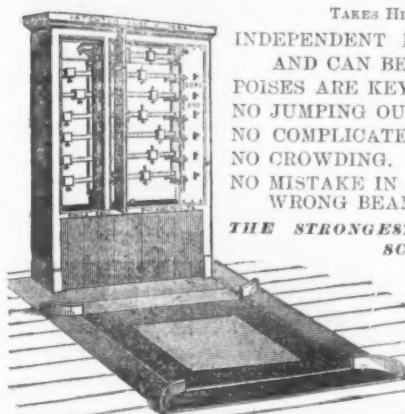
This laboratory was established in 1866, at the instance of a number of practical Iron Masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

### CHARGES TO IRON WORKS.

For determining the per cent. of Pure Iron in an ordinary Ore.....	\$4.00
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For each additional constituent of usual occurrence.....	1.50
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TAKES HIGHEST PREMIUM WHENEVER EXHIBITED.  
INDEPENDENT BEAMS. EACH BEAM IS NUMBERED  
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POISES ARE KEYS AND CANNOT SLIP.  
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NO COMPLICATED JOINTED LEVERS TO RAISE BEAM.  
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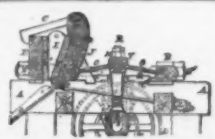
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The most perfect Dinner Pail  
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Lock and support upper and lower  
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North Chicago Steel Co., Ill.  
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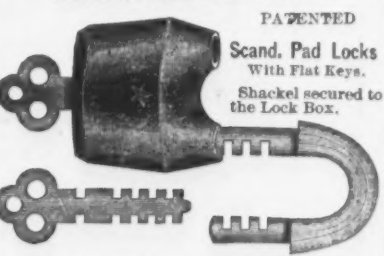
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PRATT & CO., Elmira, N. Y.  
BATHONE, SAID & CO., Detroit, Mich.  
H. W. LENTZMEYER, Cleveland, Ohio.



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Patentee and Sole Manuf' in U. S. and Canada,  
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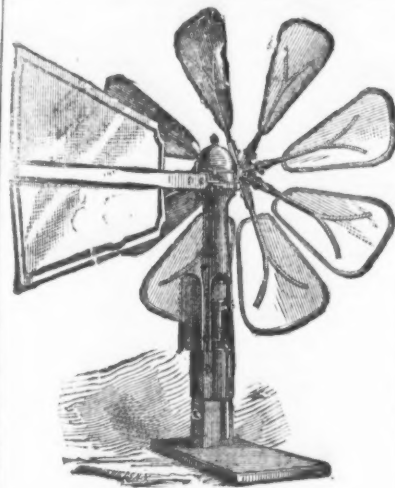
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ATTENTION.—Three tools Combined. AN ANVIL,  
the face of which is chilled, hardened and pol-  
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VISE that will hold wedge-shaped articles.  
For sale by all wholesale and retail dealers in  
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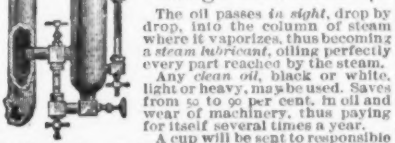
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Water Driven in any Height and Distance  
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Country Houses Supplied Cheaply and Certainly for  
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LUBRICATOR MFG. CO.'S

CONTINUOUS FEED  
Lubricator Cups

For oiling valves and cylinders of  
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method.



Through the Steam Pipe  
The oil passes in slight drop by  
drop, into the column of steam  
where it vaporizes, thus becoming  
a steam lubricant, oiling perfectly  
every part reached by the steam.  
Any clean oil, black or white,  
light or heavy, may be used. Saves  
from 50 to 90 per cent. in oil and  
wear of machinery, thus paying  
for itself several times a year.  
A cup will be sent to responsible  
parties on twenty days' trial, if desired. In ordering  
give diameter of cylinder.

NOTICE.—The first Lubricators ever made, showing  
the oil passing drop by drop through a transparent  
water chamber, were devised by us, and the same are  
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controlled by us. Lubricators of every nature em-  
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are encroachments upon our rights, and we will hold  
purchasers and users, as well as manufacturers, re-  
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First Prizes at Fair American Institute and Millers'  
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NOTE.—In our recent suit against the American Lu-  
bricator Co., of Detroit, before Justice Stanley Ma-  
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slight-feed feature, a decree was rendered in our favor  
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THE GIANT PAD LOCK.  
Manufactured by  
THE SMITH & EGGE MFG. CO.

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"Superior in Every Respect."  
This is one of the best selling Locks in the market,  
and affords the dealer a large profit. It is thoroughly  
and strongly made—of the best material—very hard  
some in appearance, and every Lock is warranted.  
Orders solicited. Address as above  
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THE LOWE PATENT  
FEED WATER HEATER & PURIFIER.

FOR  
Heating and Purify-  
ing Water for  
Steam Boilers.

Patented July 12, 1877.  
Has Straight  
Tubes.

SIMPLICITY,  
RELIABILITY and  
EFFICIENCY

At Less Cost  
Than any Other.

Write for prices and  
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the manufacturers,  
Lowe & Watson,  
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T. NEW'S  
PREPARED  
ROOFING

For steep or flat roofs. Applied by ordinary work-  
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RUBBER  
WINDOW  
CLEANERS.

We own them all, and shall suppress in-  
fringements.

The genuine Cleaner is plainly stamped,  
"MANUFACTURED BY PERFECTION  
WINDOW CLEANER CO., INCORPOR-  
ATED JULY 26, 1878."

Has Patent Hollow Handle with P. W. C.  
Co., cast in face.

Our manufacturing facilities are so large  
that we undersell cheap and worthless in-  
fringements.

We gladly mail sample cleaner with price  
lists to wholesale trade. Address

PERFECTION  
WINDOW CLEANER CO.,  
167 Madison St., Chicago, Ill.

TO MANUFACTURERS.



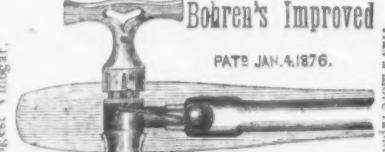
Pat. Oct. 15, 1880, and Aug. 25, 1881.

THE HENLEY ROLLER SKATE.



The latest and best light running, easily ad-  
justed, perfect. The Challenge Skate of the world.  
For price list and further particulars address

M. C. HENLEY, Patentee & Manuf'g,  
309 N. 14th St., Richmond, Ind.



Bohren's Improved  
RUBBER BALL FAUCET.  
PAT. JAN. 4, 1876.

The best Wood and Metal Faucet yet made.  
Never leaks, splits or shrinks. Is as durable as  
the brass stop-cock and is much cheaper. It  
does not poison the liquids. It is especially  
adapted for Export, as it is not affected by  
shrinkage.

U. BOHREN & CO., Manufacturers,  
250 West 27th Street, New York.  
Send for Circular and Price List.



## The Fire Risk of Electric Lighting.

The Boston Globe says: The dangers incident to the employment of electricity for illuminating purposes are being illustrated daily in all sections of the country. Only a few evenings since a man who was making a connection of the wires at the Mechanics' Fair Building was knocked almost senseless by the fluid, and another man in an establishment on Washington street was badly "shook up" by the same impartial agency. But the saddest effect of the new invention yet recorded was at the burning of a mill in Philadelphia, last week, when half-a-dozen were killed and more than twice as many made cripples for life. Quite a serious fire occurred in Chicago the other day from one of the electric light wires in the city getting "crossed" with a telephone line. It seems that Mr. Oviatt, manager of the Telephone Exchange, noticed some smoke coming from the answering board, which is composed of brass strips one-eighth of an inch apart, two of them being connected by a key or a peg for the purpose of putting subscribers in communication with each other. In a minute or two little blue and white flames began jumping from one strip to another across the space between them. The telephone manager at once suspected a cross with an electric light wire, and the wires were immediately disconnected. Returning to the board, he saw that the transmitter was burning, the current having jumped 2 feet to reach it. After cutting off another wire the box was cooled by throwing water upon it. Nothing more was observed until the lapse of one quarter of an hour, when another section of the board, 8 feet from the first one which was on fire, began to smoke. The blue and white flame was seen here too. Disconnecting the ground wire ended the display, some water being used. Half an hour later the switch-board, through which connections were made with the trunk lines, commenced to smoke, the current having jumped to feet this time. The flames ran along for 2 feet, and the board smoked for five minutes before the fire was put out. This cross was a very expensive one, the damage resulting from it being the loss of a microphone and a hand instrument in the office, and about 25 feet of the Owl Club's line on the roof. The wire melted like lead. An instrument in the store of the Chicago Music Company, situated on State street, was also destroyed, the induction coils on the inside melting. About three hundred dollars will restore everything as it was. Investigation showed that a wire had been run from Wilmoughby, Hill & Co.'s store to McVicker's Theatre for the purpose of furnishing the electric light used there a part of last week. Its use was discontinued Thursday, but the dead wire in some way dropped down on the telephone wire, the tremendous current passing through the former thus finding its way to the central office. The Chicago Tribune, in commenting on the affair, says that the effect of this "cross" shows how dangerous electric light lines are. A current that will burn carbon will set wood on fire, if it is within 2 feet of the wire and damp, and finding a better conductor than carbon, the current will take to it. If great care is not taken in stringing the lines, fires will be frequent when the electric light comes into general use.

A curious commentary upon the boast that "America feeds the world" is found in the fact that this week a considerable quantity of Irish potatoes are being imported and offered for sale in this market, while cabages from German ports are quite plentiful.

Andrew J. Rice, an insane man, has, through his guardian, begun suit against three shoe manufacturers of Lynn, Massachusetts, for \$25,000 damages, for the use of the steel shank for shoes, the plaintiff claiming the ownership of the patent.

## Special Notices.

## For Sale.

The Industrial Works of Shamokin, owned and successfully carried on for a number of years by the late Wm. Brown, deceased, consisting of Foundry and Machine Shop, and a large stock of Patterns regarded as part of the property. Boiler Shop, Blacksmith Shop and Factory for the manufacture of heavy coal screens. Well located in the borough of Shamokin, Pa., with the best facilities for shipping by rail, and surrounded by a district contributing all the work that a shop of that kind can possibly turn out. The works are now running, but in a very short time possession can be given. Easy terms of payment are offered to suit a purchaser of limited capital. Offered for sale by

WM. McILVAIN & SONS,  
Reading, Pa.

## FOR SALE.

Pulley Lathe, built by N. Y. Steam Engine Co., double ended, swings up to 6 ft. Boring Mill, double column, 5 ft.; 30 and 300 H. P. Corliss Engines; new 40 H. P. Vertical Boiler, 9 ft. in flange iron; Pulley, 9 ft. 10 in. face; Pulley, 2 1/2 ft. 12 in. face. Lot Woodworking Machinery, Pulleys, &c. A. G. BROOKS & WILKINSON,  
261 N. 3d St., Philadelphia.

## For Sale.

A stock of Hardware, Leas and Fixtures, in an excellent location, in one of the largest cities of Western New York. Goods all new and well selected. Must be sold immediately on account of failing health of proprietor. For particulars inquire of

SARGENT & CO.,  
New York, or New Haven, Conn.

## For Sale.

288 tons 56-lb. 4-in. Iron Rails, with Fastenings and Spikes, in lots to suit. C. W. LEAVITT,  
137 Broadway, New York.

WANTED—A situation after January 1, to sell Hardware, by a gentleman who has traveled for 10 years among the Western trade. The best of references given. Address G. B. Office of The Iron Age, 83 Reade St., New York.

WANTED—From Jan. 1, 1882, situation as salesman with stamper ware manufacturer, by one who has had 15 years' experience. Address T. WARE, Office of The Iron Age, 83 Reade St., New York.

## Special Notices.

## New and Second-Hand

## MACHINERY.

One Horizontal Engine, 3 in. x 6 in.  
One Beam Corliss Engine, 500 H. P.  
Portable Engines from 12 to 25 H. P.  
Two Horizontal Return Tub. Boilers, 100 h. p. each.  
One Hor. Tubular Boiler, 6 ft. x 14 ft., 67 1/2 in. tubes.  
Two Hor. Tub. Boilers, 2 1/2 ft. x 1 1/2 ft., 43 1/2 in. tubes.  
One Locomotive Steel Boiler, 30 h. p.

## MACHINISTS' TOOLS.

Two Lathes, 14 in. x 4 ft., 4 in. bed.  
One No. 2 Woodward Pump.  
Five Lathes, 22 in. x 12 ft. New.  
Five Lathes, 15 in. x 8 ft. New.  
One Lathe, 17 in. x 8 ft. Lincoln.  
Two Lathes, 16 in. x 6 ft. Wood & Light.  
One Lathe, 16 in. x 6 ft. Blaisdell.  
One Planing Machine, 35 in. x 8 ft.  
One Milling Machine, No. 4. Wood & Light.  
One Burleigh Rock Drill, No. 4. New.  
One Pipe Cutting Machine.  
One Styles & Parker Foot Press.  
One Peck, Stow & Wilcox Foot Press.  
One Cameron Steam Pump, No. 2.  
One Knowles Special Pump, No. 7.  
One 6 in. Tapping Machine, D. Saunders' Sons.  
One Daniels Planing Machine.  
One 100-ton Hydraulic Press and Pump.  
One Root Engine.  
One Pipe Cutting Machine.  
One pair Paper Rolls.  
A large stock of Shafting, Pulleys, Hangers, Vises (Wrought and Cast), and other Miscellaneous Machinery.

J. GRAY'S MACHINERY DEPOT,  
37 Dey Street, New York, U. S. A.

## Wanted.

An Experienced Mechanical  
Draughtsman.

Address, THE BURDEN IRON CO.,  
Troy, N. Y.

## Wanted.

A BLAST FURNACE FOUNDER.  
Address, THE BURDEN IRON CO.,  
Troy, N. Y.

## The Sherman Process Co.

9 Pemberton Square, Boston, Mass.,  
Issue Licenses to use the Process for the  
Manufacture of Iron and Steel  
In the Bessemer Converter, Crucible, Siemens  
Martin, Puddling, Blast and Cupola Furnaces.  
The use of this Process improves the quality of  
the product, saves fuel and labor, and does not re-  
quire any change in furnace or manner of working.  
See page 17 of The Iron Age of Oct. 25th, 1877.

## Wanted.

VERTICAL BORING AND TURNING MILL,  
new or second hand, to swing 7 to 12 feet. State  
maker, time of delivery, price, age, condition, and  
where it can be seen. Address  
N. PORTZ & CO.,  
Fostoria, Ohio.

## MINING ENGINEER WANTED

to take charge of one or more Hematite Ore  
Mines, in a healthy location. Must be experienced,  
of good habits, and thoroughly acquainted with  
mining in levels and on surface. State full partic-  
ulars as to age, experience, and where formerly  
operating. Address,  
MINING ENGINEER, Box 25,  
Office of The Iron Age, 83 Reade St., New York.

## WANTED—HARDWARE.

A purchaser for a wholesale Hardware House al-  
ready established, and doing an excellent business,  
situated in the city of Cincinnati. The business as a  
whole or a controlling interest, can be obtained. The  
Great Southern Railroad, leading into the heart of  
the South and Texas, opens up such an extensive  
territory that the business can be enlarged as capital  
and desire may dictate. A satisfactory showing can  
be made to any parties wishing to consider the pur-  
chase. Address,  
Office of The Iron Age, Cincinnati, O.

## For Sale.

SECOND-HAND  
DROPS AND LIFTERS  
BEECHER & PECK,  
Lock Box 122, New Haven, Conn.

## For Sale.

A well selected stock of Hardware in a thriving  
county seat in Ohio.  
Stock not first-class, and in splendid order.  
Stock not large but very complete. This is a  
rare opportunity. For particulars, address,  
"OHIO,"  
Office of The Iron Age, 83 Reade St., New York.

## For Sale.

A Locomotive of standard gauge and in running  
order; Cylinders 13 1/4 x 22; made at Baldwin  
Works, Philadelphia.  
JOHN H. BRAKELEY,  
Bordentown, N. J.

## For Sale.

FACTORY FOR SALE.  
The Clintonville Agricultural Works, at North-  
ford, Conn., eight miles from New Haven, near the  
station on the Boston and New York Air Line  
Railroad. Suitable for Hardware or kindred man-  
ufactures. Complete with engine, boiler and tur-  
bine wheel. Property consists of about four acres  
with water privilege. Foundry and Blacksmith  
Shop, Engine and Boiler House, also three-story  
building with elevator, store house, iron sheds, &c.  
Apply to HORACE P. HOADLEY, New Haven,  
Conn., or CARR & HOBSON (Limited), 47 CHURCH ST.,  
New York.

## WANTED.

An engagement as an assayer and chemist by a  
young scientist of ability and experience.  
Address F. C. S.,  
Office of The Iron Age, 83 Reade St., New York.

POSITION as Superintendent for Foreman in a  
large establishment; 15 one that has had  
large experience; is a practical machinist and  
tool maker. A 2 reference.  
Address S. C. LEWIS, 813 Sackett Street,  
Brooklyn.

## Special Notices.

## Second-Hand &amp; New Machinists' Tools.

In Store Oct. 27, 1881.  
Two Car Axle Lathes, Hewes & Phillips, New.  
One 50 in. x 15 ft. Horizontal Boring Lathe, Pond.  
One Engine Lathe, 32 in. x 24 ft. Wood & Light triple  
headed. Nearly new.  
One Engine Lathe, 26 in. x 18 ft. Putnam.  
One Engine Lathe, 26 in. x 15 1/2 ft. Good order.  
One Engine Lathe, 24 in. x 17 ft. Pond.  
One Engine Lathe, 30 in. x 18 1/2 ft. New Haven.  
One Engine Lathe, 28 in. x 18 ft. Ames, New.  
One Engine Lathe, 27 in. x 17 ft. P. Klyn's E. Works.  
One Engine Lathe, 24 in. x 12 ft. Ames, New.  
One Engine Lathe, 20 in. x 10 ft. New Haven.  
One Engine Lathe, 20 in. x 12 ft. Harrington.  
One Engine Lathe, 20 in. x 10 ft. Pond.  
One Engine Lathe, 20 in. x 10 ft. Phoenix.  
One Engine Lathe, 18 in. x 8 ft. J. & L. With turret  
head.  
One Engine Lathe, 16 in. x 6 ft. Bridgeport Mch. Iron  
Works.  
One Engine Lathe, 15 ft. x 8 in. P. & W.  
One Engine Lathe, 13 in. x 4 1/2 ft. Good order.  
One Engine Lathe, 12 in. x 7 ft. Hewes & Phillips, At.  
One 20 in. Drill, 15 in. x 6 ft. J. & L. With turret  
head.  
Two Sensitive Drills. (Flather). New.  
One Radial Drill, 22 in. x 2 ft. self-feed, nearly new.  
One 20 in. Drill, 15 in. x 6 ft. J. & L. With turret  
head.  
Three 24 in. Upright Drills. Ames, New.  
Four 20 in. Upright Drills. Prentice, New.  
Three 15 in. Upright Drills. Prentice, New.  
One Index Millers, Pond.  
One 15 in. x 3 1/2 ft. Fox Lathe, New. Eq. arbor.  
Two single Milling Machines.  
One No. 3 E. E. Garvin & Co. Hand Mill. New.  
One No. 2 Pratt & Whitney Mill. Lincoln.  
Fifty Lincoln Pattern Milling Machines.  
One Gear Cutter, 24 in. Gould.  
Six Hand Lathes, 12, 14 and 16 in. s. x 2 1/2 to 7 ft. bed.  
One 24 in. Shaper. Houdouin Mch. Co., New.  
One 14 in. Shaper. Houdouin Mch. Co., New.  
One 14 in. Shaper. Steptoe, New.  
One 14 in. Shaper. Gould, New.  
One 12 in. Shaper. Gould, Second-hand.  
One 6 in. Shaper. Hewes & Phillips, New.  
One 24 in. x 8 ft. Planer. Harris, Good Order.  
One 24 in. x 8 ft. Planer. Aldous, G. & Co.  
Three 15 in. x 3 1/2 ft. Planers.  
One Crank Planer, 12 in. stroke. At.  
One 80-pension Drill, Back Geared. At.  
One 6-spindle Horizontal Drilling Machine.  
One 100 lb. Sweet's Steam Hammer. (Gine. New).  
One 14 in. x 30 in. Baird and Huston Slide Valve En-  
gine, Shafting, Pulleys and other Miscellaneous Ma-  
chinery. Lot of Wood-Working Machinery. (ery.)

E. P. BULLARD, 14 Dey St., New York,  
GENERAL EASTERN AGENT FOR  
Akron Iron Co.'s Hot Polished Shafting.

Bolt, Nut and Washer  
Machinery For Sale.

Six 1 1/2 in. double-head Bolt Cutters with auto-  
matic stop, and powerfully geared, and particu-  
larly adapted to cutting Track Bolts or large quan-  
tities of bolts of various sizes.  
Four 3/4 in. double-head Bolt Cutters, the same as  
are used in all large bolt factories.  
Two 4-spindle and One 6-spindle Nut Tappers.  
Two No. 2 Washer Machines for making all wash-  
ers to 3/4 in.  
One No. 1 Washer Machine for washers up to 1  
in. Bolt Size.  
Two Bolt Headers with latest and best improve-  
ments for all bolts to 1 in. Strongest heads and  
largest variety of any machine in use.  
One No. 1 Nut Machine for 1 1/2 in. Nuts, hexa-  
gon or square.  
Two No. 2 Nut Machines for No. 1 Nuts, and all  
smaller; 1000 lbs. of 3/4 in. Nuts made per day.

YORK & SMITH,  
Cleveland, Ohio.

## For Sale.

## Three Large Foot Presses.

Three Tin Manufacturers' Foot Presses, made by  
Comor, of Brooklyn; have 17 1/2 in. opening  
in bed and one 7 x 7; all have his patent adjustable  
bed plates. They are in first-class order and will  
be sold at very low prices.  
A lot of 16 round combination dies for tops and  
bottoms, large and small, made for them, will be  
given gratis with the presses, or sold separately  
for one-third their value.  
We make all styles and sizes of Punching and  
Shearing Presses for metal workers—power, foot  
or hand—from \$25 to \$2000. Also, Upright Power  
Drill Presses, from \$25 to \$150.  
PEERLESS PUNCH AND SHEAR CO.,  
115 W. Liberty St., New York.

## FOR SALE.

Two blowing cylinders 40 x 60 inches, with top  
manifold and connections. Engine 12 x 35 inches.  
Crank shaft with gears; fly wheel 12 ft.; belt  
wheel 9 feet, 15 inch face. One saw rigged for  
cutting off has 15 foot cog-gear carriage, bed  
plate 15 x 2 feet x 2 1/2 inches thick. One saw with  
rigging for slitting iron, with carriage and bed.  
Will sell the above separately or together at a  
bargain.  
YORK ROLLING MILL, York, Pa.

## Hardware Business For Sale.

Ten years established. Stock is clean and well  
assorted. City is growing very fast—large amount  
of building now in progress. Address  
W. C. ROGERS,  
Manchester, N. H.

MALLEABLE IRON.—Situation wanted as  
foreman, by a man of twelve years' experi-  
ence in that capacity, who is thoroughly ac-  
quainted with the manufacture of Malleable Iron  
in all its details. The improvements consist  
of one forge with five fires and run-out, with  
Shenandoah river for power; mansion house,  
stable, dw. ings, &c. One furnace with height of  
14 feet and 10 1/2 feet. The forge is within one  
mile of Weyers Cave station on Shenandoah Val-  
ley Railroad, 17 miles from Waynesboro. This  
road, recently completed, runs between forge and  
furnace.  
Apply to  
P. O. BOX 185,  
Baltimore, Md.

## For Sale.

A quantity of Coal Oil Vapor Torches. These  
are of the best make. Manufactured by the Vapor  
Oil Stove Co. They give a clear white flame of  
great power. Are safe, durable, and economical,  
and are just the thing for foundrymen and ma-  
chines. Sample torch, \$3.  
Address  
J. R. LOOMES,  
32 Marion St., Cleveland, O.

## For Sale.

Mount Vernon Iron Works, Virginia.  
Located in Augusta and Rockingham Counties.

This property consists of over 30,000 acres land,  
on which are valuable deposits and mines of ore  
and tracts of timber. The improvements consist  
of one forge with five fires and run-out, with  
Shenandoah river for power; mansion house,  
stable, dw. ings, &c. One furnace with height of  
14 feet and 10 1/2 feet. The forge is within one  
mile of Weyers Cave station on Shenandoah Val-  
ley Railroad, 17 miles from Waynesboro. This  
road, recently completed, runs between forge and  
furnace.  
Apply to  
P. O. BOX 185,  
Baltimore, Md.

FOR SALE.—Steam Engine in good order, prac-  
tically new, large fly-wheel, cylinder, 16 x 24.  
Also large up-right boiler and attachment. Shaft-  
ing, pulleys, circular saws, h-tines, &c., &c.  
WM. IRWIN,  
152 B'way, N. Y.

## Special Notices.

## For Sale.

The Little Schuylkill Rolling Mill,  
at Milldale, Schuylkill County, Pa., near Port Clin-  
ton, on the line of the Philadelphia and Reading  
Railroad, consisting of a Merchant Bar Mill in  
complete running order, with a splendid water-  
power sufficient to run the mill two-thirds of the  
year. Engines, Boilers, Foundry and Machine  
Shop, with Lathe for turning rolls, and all other  
appurtenances necessary to commence operation  
at once. Together with dwellings, stables and  
large tract of land, to be sold low if applied for  
soon. For further particulars address or apply to  
J. O. RICHARDSON,  
No. 232 Dock street, Philadelphia.

## FOR SALE LOW.—ENGINE.

A Vertical High-Pressure Steam Engine, com-  
plete. Cylinder, 24 in. by 48 in. Built by A. J.  
Sweeney & Son. Can be seen in daily use at our  
mill factory.  
LA BELLE IRON WORKS,  
Wheeling, West Va.

## For Sale.

Two Corliss Condensing  
Beam Engines,  
32 in. x 22 in. cylinders. Address,  
THE HARTFORD ENGINEERING CO.,  
Hartford, Conn.

## For Sale.

Stock of Hardware, Fixtures, and Good Will of  
the subscribers, in the city of Norwich, Conn.  
Only one other hardware store. Population  
21,000.

FULLER & PARISH.

## For Sale.

Hardware Stock and Trade in Michigan.  
Those wishing to buy a complete stock and fine  
trade, and in a beautiful place to live, will find a  
rare chance by addressing  
S.,  
Office of The Iron Age, 83 Reade St., New York.

## For Sale.

One 20-inch Engine, one 100-horse Locomotive  
Boiler; two large Pulleys, 30-inch face; a 20-inch  
Rubber Belt, &c. All in good order, and will be  
sold for less than value to make room for larger.  
Can be seen running at  
AKRON RUBBER WORKS,  
Akron, Ohio.

## For Sale.

Hardware Stock and Business.  
Located in one of the best towns of Northeastern  
Pennsylvania. Stock clean and well assorted,  
suited to the requirements of the trade where  
located. Business of 20 years' standing. For  
terms and full particulars apply to  
JAMES S. KCHN, Towanda, Pa.

## For Sale.

Ten Double Acting Power Punching Presses,  
At order. Eight Single Acting Power Punching  
Presses, At order. Most of the double acting  
presses are the No. 3 Waterbury Press; the single  
acting, No. 2. One large Bliss & Williams Punch-  
ing Press. One hundred and twenty-seven Foot  
Presses in At order, most of them square slides.  
Address, THE GEORGE PLACE MACHINERY  
AGENCY, 121 Chambers and 103 Reade sts., N. Y.

## For Sale.

Stock of hardware, stoves and implements, and  
store furniture, in one of the best towns in Kansas.  
Address  
HARDWARE,  
Box 366, Salina, Kansas.

## ELECTRIC LAMP.

For sale, United States Patent No. 245,933;  
granted for an Electric Lamp, Aug. 23, 1881.  
Address  
"ELECTRIC,"  
Office of The Iron Age, 220 S. 4th St., Phila., Pa.

## BUSINESS CHANCE.

A first-class Retail Hardware Store in the vicin-  
ity of New York City for sale on reasonable  
terms. One who desires to acquire a business  
can be employed for a month or two to get ac-  
quainted with the entire place.  
Address  
E. H.,  
P. O. Box 692, N. Y.

## For Sale.

Just what every machine shop, foundry, rolling  
mill, engine room, &c. requires this season of the  
year is the  
Dangler Vapor Illuminating Torch,  
a brilliant, economical and convenient light.  
Sample torch sent on receipt of \$3. See cut in  
this issue of Iron Age. Address  
DANGLER VAPOR & REFINING CO.,  
Cleveland, Ohio.

## Wanted to Lease.

A BLOOMARY FORGE,  
With four to six fires. Water power preferred.  
In answering advertisement, give size of build-  
ings, construction of fires and price asked.  
Address  
CHARCOAL BLOOM,  
P. O. Box 1042, New York City.

## Wanted.

A good Bookkeeper, one who is thoroughly  
familiar with furnace books and accounts.  
Address, with references,  
E. O. LACKLAND,  
St. Louis, Mo.

Hardware Business for Sale,  
In thriving village of 5000 inhabitants in Southern  
New York. Three lines of railroads to New York.  
Doing about \$50,000 business a year. Trade could  
easily be increased to \$70,000 by putting in stock  
bar iron, steel, &c. Satisfactory reasons furnished  
for selling. Please address  
"C.,"  
Office of The Iron Age, 83 Reade St., New York

## Special Notices.

## JOB LOT.

ELEY BROTHERS'  
GENUINE BLUE CARTRIDGE CASES,  
Twelve Gauge.  
The best paper shell in the market. For sal  
cheap. Supply limited.

ALFRED FIELD & CO.,  
93 Chambers St., N. Y.

## Copartnership Dissolution.

NOTICE is hereby given that by the death of the  
junior partner, Mr. Nathan Anthony, the firm of  
BRADFORD & ANTHONY is this day dissolved.  
The affairs of the firm will be settled by the under-  
signed, the sole surviving partner, MARTIN L. BRADFORD.  
Boston, June 12, 1881.  
All communications in regard to the affairs of the  
late firm should be addressed to  
BRADFORD & ANTHONY, Boston, Mass.

MARTIN L. BRADFORD hereby gives notice that  
he will continue his business under the name of  
"BRADFORD & ANTHONY."  
The estate of the late Nathan Anthony is to be in no  
way interested in the future business, whether con-  
ducted under the name of Bradford & Anthony or  
otherwise.  
All business communications should be addressed to  
BRADFORD & ANTHONY,  
274 Washington St., Boston.  
Importers, Manufacturers' Agents and Dealers in  
Cutlery, Fishing Tackle, Skates.  
See advertisement first issue of each month.

## HEAVY IRON WORKS WANTED.

An Eastern Manufacturing Company, doing a profit-  
able business in heavy wrought iron structures, the  
manufacture and sale of which they control for the  
United States and Canada, wish to establish additional  
work, located in the West, South, Pacific Coast and  
Province of Ontario. Must have first-class freight  
advantages for receiving rolled structural and mer-  
chant iron. Address  
WM. O. DOUGLAS, Binghamton, N. Y.

## Notice.

The undersigned firm would be pleased to accept  
the representation of first-class firms manufacturing  
machinery. Address,  
J. S. LIZARS & CO.,  
Manufacturers of Shells & Lizards' Feed Water  
Heater and Purifier, and dealers in New and Sec-  
ond-hand Machinery, 33 Fifth Avenue, cor. Lake  
street, Chicago, Ill.

HOW TO  
KEEP BOILERS CLEAN,  
And Other Valuable Information.

A book sent free to engineers and steam users by  
JAMES F. HOTCHKISS,  
84 John St., NEW YORK.

## NOTICE.

TO THE HARDWARE TRADE,  
Retail and Wholesale.

Before buying, send to me for quotations.  
Will give special figures lower than market  
rates on a large line of Shelf Hardware and  
Tinware.

A. W. WHEELER,  
141 Lake St., Chicago.

Bissell & Welles,  
Wholesale Hardware Auctioneers  
83 Chambers and 65 Reade Sts., N. Y.

Sales held weekly for the trade. Consignments  
solicited. We refer to the leading Manufacturers  
and Importers.

## Wanted.

Some specialty in Hardware to sell on the road  
on commission or salary. Have had eight years'  
experience in the Hardware business. Would  
prefer to travel West. Best references.  
Address  
SPECIALTY,  
Office of The Iron Age, 83 Reade St., New York.

## Wanted.

By an engineer of extensive experience, thor-  
ough knowledge, exemplary habits and satisfac-  
tory personal and professional credentials, a posi-  
tion as superintendent or manager of an iron or  
steel rolling mill. A thorough, practical acquaint-  
ance with all departments of rolling mill work  
guaranteed. Address,  
MANAGER,  
Office of The Iron Age, 83 Reade St., New York.

## Wanted.

\$3000 to \$5000 Working Capital  
(with or without services), to work a valuable  
Magnetic Iron Ore Mine that will pay 50 per cent.  
on the investment. Only those with cash and  
meaning business address, MAGNETIC,  
Office of The Iron Age, 220 S. 4th St., Phila., Pa.

## For Sale.

A Foundry, well located in Philadelphia, with a  
good run of business. A first-class opportunity  
for party with a few thousand dollars.  
Address  
"FOUNDRY,"  
Office of The Iron Age, 220 S. 4th St., Phila., Pa.

## For Sale.

Four Double-flue Steam Boilers, 28 feet long, 42  
inches in diameter; in first-class condition, with new  
steam and mud drums and new fire fronts.  
For further particulars apply to  
SHOENBERGER & CO.,  
Pittsburgh, Pa.

## To Manufacturers and Others.

FOR SALE,  
Combined Shear, Punch, Upsetter and Bender  
Patents—Reed & Bygones'. Terms reasonable.  
C. W. TORREY, 167 West 23d St., New York City.

Sanderson Bros. Steel Co.  
Forty shares for sale at a discount.  
EDWARD FRITH & SON,  
221 Pearl street, New York



Office of THE IRON AGE, }  
WEDNESDAY EVENING, NOV. 9, 1881. }

	Since January 1—	
	1881.	1880.
Gold...	\$50,742,423	\$46,252,386
Silver...	2,469,706	4,442,139
Total...	\$53,212,129	\$50,694,525

**GENERAL HARDWARE.**

The Dibley Mfg. Co., Trenton, N. J., have issued a revised price list, showing, in addition to their goods with which the trade are familiar, a new line of Sash Locks which they style the "Grodavent," and of which they say: "This Sash Lock is opened and closed by a single, simple and natural movement, and is, by the same motion, securely locked upon a perfect dead center. It cannot be opened in any but the proper way. It has no springs, and can never get out of order." We print below their price list for these goods, which is subject to discount 40 and 5 per cent., and 10 per cent. extra for spot cash:

### BRITISH IRON MARKET.

**Manufactured Iron.**—The market is active and transactions large. There is no change to note in quotations, which remain firm at £7. 10/ @ £8 for Best Staffordshire Bars.

**IRON.**

**Scrap.**—No sales of Wrought Scrap have come to our notice during the week. No. 1 Wrought, to arrive, is quoted \$31, and prime selected from yard, \$32.50.

## METALS.

quantity is likely to be somewhat increased by October shipments from Australia. Shipments thence to Europe and America combined in October figured up 900 tons, and it is expected by parties trading with Australia that shipments from there in the course of the present month will reach 1,200 tons.

50 tons Western just sold. The dull winter season approaching, of course not much animation is in prospect, and the chances are that if anything prices will tend toward a lower level, unless something occurs to

Hardware.....	50	2,495
Iron, pig, tons.....	9,974	175,194
Iron, sheet, tons.....	141	12,630
Railroad bars.....	1,620	11,883
Iron ore, tons.....	717	1,379
Iron, other, tons.....	1,549	52,314
Machinery.....	104	10,860
Metal goods.....	587	28,197
Tools.....	6	1,161



Hayti.	
Nails, kegs...	25
Plm., gals...	201
Hdw., cs...	5
Sew. ma., cs...	141
Glasgow.	
Sew. ma., cs...	3,860
Mf. iron, pgs...	2,135
Ag. imps., pgs...	277
Clocks, pgs...	1,771
Cartridges, cs...	3,850
Genoa.	
Plm., gals...	8,800
Pittsburgh.	
Plm., gals...	30,952
Central America.	
Sew. ma., cs...	145
Mf. iron, pgs...	770

## IMPORTS

Hardware.	
American Xylond Co.	Lundberg Gustav.
Mach'y, pgs...	Colls, 1532
Baker Hermann & Co.	Wire rope, coils, 5
Hdw., pgs...	Marneff, pgs...
Boles & Hyman.	Frames, pcs. and
Mach'y, cs...	bdls., 325
Burkshaw W. C.	Milliken & Smith.
Pgs...	Iron wire, bds., 2,068
Buchanan & Lyell.	Bars, 2438
Mach'y, cs...	Ogden & Wallace.
Cuthers & Co.	Bars, 5471
Cases, 3	Flgs, Dodge & Co.
Conover & Co.	Fig. tons, 250
Cases, 7	Pierison & Co.
Files, cks, 10	Rails, 3304
Dolge A.	Sheets, iron, 864
Case, 1	Rea J. & Co.
Dale John G.	Fig. tons, 300
Case, 2	The Bowker Fert. Co.
Duval H. R.	Rough castings, &c.
Grates, cs, 2	Case, 746
Cases, 12	Whitney A. R.
Davis & Co.	Tubes, 632
Packages, 2	Order.
Drexel Morgan & Co.	Fig. tons, 1254
Case, 1	Rails, 2120
Arms, cs, 16	Sheet iron, pgs...
Degrauw, Aymar & Co.	Wire rods, bds., 1,059
Chain lengths, 4	Order, tons, 1175
Eggers & Heinlein	Rods, pgs, 436
Arms, cs, 4	Swedish bars, 4992
Field Alfred & Co.	Old iron, tons, 143
Caps, cs, 10	Bars, 1151
Cases, 32	Fish plates, bds., 3776
Chains, cks, pgs, 15	Tons, 502
Folsom H. & D.	Spiegel, tons, 341
Arms, 25	Old iron, pgs, 628
Furness, Bannister & Co.	Old iron rails, tons, 500
Case, 1	Old scrap, tons, 473
Gurney B. F.	Old scrap, lot
Case, 1	
Garner & Co.	
Mach'y, cs, 3	
Godfrey C. J.	
Guns, cs, 4	
Graef Cutlery Co.	
Pgs, 81	
Hartley, Graham & Co.	
Arms, cs, 42	
Hart A. H. & Co.	
Mach'y, cs, 16	
Heide Henri.	
Mach'y, pgs, 2	
Hudick A. H.	
Chains, cs, 10	
Chaus, pcs, 12	
Jordan & Black	
Mach'y, cs, 16	
Kirschmidt A.	
Mach'y, cs, 2	
Kittel J. & Co.	
Cases, 34	
Kerr & Co.	
Mach'y, cs, 2	
Lery C. A. & Co.	
Nails, kegs, 10	
Merchants' Dispatch Co.	
Gun caps, cs, 8	
Hdw., cs, 7	
Cutlery, cs, 2	
Meyer H. A., Jr.	
Bales, 8	
Cases, 3	
Bundles, 46	
McKinless J. A.	
Case, 1	
Moore's Sons J. P.	
Arms, cs, 24	
Moss F. W.	
Mide, cks, 5	
Rowland A. W.	
Mach'y, pgs, 4	
Remington & Son	
Rifles, cs, 2	
Rogers Henry.	
Cases, 9	
Smith C. B. & Co.	
Case, 1	
Sellers W. B.	
Cutlery, cs, 2	
Squires H. C.	
Guns, cs, 2	
Schoverling, Daly & Co.	
Gales, 10	
Arms, cs, 8	
Scott Wm. P.	
Arms, cs, 6	
Tillotson L. O.	
Pgs, 5	
Taylor Thos.	
Case, 1	
Van Cleef & Co.	
Ironware, cs, 11	
Ward Stanton & Co.	
Mach'y, pgs, 3	
Wellschlag, Higer & Co.	
Cases, 6	
Wilmington, Hoguet & Co.	
Mach'y, cs, 3	
Winchester Arms Co.	
Case, 1	
Wright Peter	
Cases, 10	
Order.	
Cases, 9	
Files, cs, 5	
Arms, cs, 13	
Avril, 20	
Mach'y, cs, 10	
Cutlery, cs, 1	
Hdw., cs, 13	
Piping, cs, 3	
Iron.	
Barling, Bros. & Co.	
Nail rods, bds., 1687	
Wire, coils, 661	
Bars, 2834	
Fig. tons, 11,133	
Brown Bros. & Co.	
Bars, 2343	
Bond, Parsons & Co.	
Fig. tons, 100	
Coddington T. B. & Co.	
Sheet, bds., 255	
Dickerson, Van Dusen & Co.	
Sheet, bds., 244	
Drexel Morgan & Co.	
Sheet iron, pgs, 250	
Ore, tons, 172	
Elliott, Sons & Co.	
Ore, tons, 172	
Fernandez & Calvo,	
Carboys, cs, 4	
Henderson Bros.	
Castings, bds., 4	
Castings, cks, 1	
Old axles, 139	
Irwin R. & Co.	
Fig. tons, 208	
Lee Jas. & Co.	
Fig. tons, 100	
Lillenberg N.	
Bars, 1750	
Bundles, 59	

## OLD METALS, PAPER STOCK, &amp;c.

The purchasing prices offered by dealers are as follows:

Copper, heavy	10.15 @ 10.16
Copper Bottoms	10.15 @ 10.16
Yellow Metal	10.15 @ 10.16
Brass, heavy	10.15 @ 10.16

Brass, light	10.15 @ 10.16
Composition, heavy	10.15 @ 10.16
Lead, heavy	10.15 @ 10.16
Tin Lead	10.15 @ 10.16
Zinc	10.15 @ 10.16
Pewter, No. 1	10.15 @ 10.16
Pewter, No. 2	10.15 @ 10.16
Wrought Iron	10.15 @ 10.16
Stove Plate	10.15 @ 10.16
Machinery do.	10.15 @ 10.16
Grate Bars	10.15 @ 10.16

The prices current (prices paid by local dealers) for Rags, &c., are as follows:

Canvas, Linen	10.15 @ 10.16
White Cotton	10.15 @ 10.16
No. 2	10.15 @ 10.16
White, No. 1	10.15 @ 10.16
No. 2	10.15 @ 10.16
Soft Woolens	10.15 @ 10.16
Mixed Rags	10.15 @ 10.16
Gunny Bagging	10.15 @ 10.16
Butte	10.15 @ 10.16
Kentucky Bagging	10.15 @ 10.16
Book Stock	10.15 @ 10.16
Newspapers	10.15 @ 10.16
Waste Paper and Scraps	10.15 @ 10.16
Kentucky Bale Rope	10.15 @ 10.16

## COAL.

The Coal trade was never more active than at present—in deliveries rather than sales, however—as the scramble for preparation for winter is visible in all directions. As the agents remark, "everybody wants something," and accordingly, the operators have enough to do in filling allotments or orders given long ago, without seeking for new contracts. The full circular rates are maintained, and where deliveries can be made without delay, more than current prices are realized, but not because prices are higher. Trade of oars is still the general complaint. Trade is spoken of as taking a natural course; none are waiting, because they are expecting to buy cheaper, and none are buying, because they are fearful that prices will advance. The prevailing activity is simply to meet current demands. So far as the transaction of fresh business is concerned, trade is comparatively quiet. The Western demand continues to increase. Quotations remain unchanged: Lehigh, \$5 @ \$6.25 for Lump; Grate, Egg & Stove, \$4.25 @ \$4.45; Chestnut, \$4; Wyoming, \$3.90 @ \$4.20 for the usual sizes.

In Bituminous Coals the same general features are observed. Producers are not offering, because they have about all they can do to keep their contracts, so long as the present scarcity of cars continues. Freight from Baltimore to New York are \$1.60, and for Gas Coal, where wants are urgent, as high as \$1.75 per ton has been paid. For Cumberland, \$5 alongside in New York would be a fair quotation.

The Philadelphia North American says: "The steady demand from New England continues to furnish employment for all the vessels at remunerative rates. The great request for domestic sizes tends to limit the opportunity for supplying manufacturing sites, and the demand for the latter will be more evenly maintained for some distance into next year on account of this delay."

Freights eastward have advanced to \$1.40 @ \$1.45 to Boston and \$1.05 to Providence. There is some delay at the docks, depending on the size of the Coal, especially for the Domestic sizes, Stove and Chestnut.

The Pottsville Miners' Journal says: "The production this year will greatly exceed that of any previous year since the discovery of Anthracite Coal, and the demand being legitimate—that is for the actual needs of consumers—there will be no overstock to clog the trade of next year. If Coal were selling at the low prices of 1879 we might reasonably expect that a large quantity was being bought for storage and speculation; but the fact that prices are held firmly at circular rates, which are 50¢ higher than in 1879, is pretty good evidence that all the Coal now bought is wanted for immediate use."

The total tonnage of all kinds of Coal for the week is 740,699 tons, against 722,287 tons in corresponding week last year, an increase of 18,412 tons, and the total tonnage for the Coal year is 27,244,551 tons, against 27,741,025 tons to same date last year, an increase of 4,503,526 tons.

## PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., Philadelphia, Nov. 8, 1881.

**Pig Iron.**—The market retains all the strength noticed a week ago, and in some cases we find further indications of an advancing tendency. Good Irons are scarce, and so long as the demand continues in its present proportions there is very little chance of an easier market. We are inclined to the opinion, however, that a good deal of buying lately has been by parties at a distance who were anxious to avoid winter rates of freight, and now that they are supplied there will be less difficulty in placing orders for the current demand. In any event the furnaces are nearly all bare of stock, and in many cases under contract for two or three months ahead, so that steady or easier rates can only be expected by a falling off in demand. There is no reason to anticipate a falling off in consumption, as most of the large concerns are already full of work to last them three to six months, with prospects as good as at any time during the year for a continued heavy demand. Stocks of foreign Iron are almost exhausted, so that at present prices, calculations have to be based almost exclusively on the domestic product. If a further advance is made, it may open the way to foreign Iron, which can still be laid down at \$20.50 @ \$21.50, notwithstanding the high rates of freight. A demand for grain freights might give importers a dollar a ton advantage, so that an advance in prices here, a decline in Great Britain, or easier freights, are contingencies any one of which might exercise an important influence upon values. The Iron trade is therefore in a somewhat precarious condition, notwithstanding its undoubted activity; the chief danger being that prices may be forced to a point at which foreign Iron may again be brought into competition with the domestic product. The trade generally are working cautiously, and doing their best to avoid complications of this character, but if the scarcity which has been developed during the past 30 days is extended another 30 days, it will be almost impossible to avoid some of the dangers indicated. In the meantime sales have been

made at \$22 @ \$23 for Gray Forge; \$23.50 for No. 2 Foundry, and \$25 @ \$27 for No. 1 Foundry. At the inside quotations there is very little Iron to be had, and the great bulk of business is done at about \$23 for Gray Forge and \$25.50 @ \$26 for No. 1 Foundry; other transactions are of an exceptional character.

**Foreign Iron.**—Stocks of Middlesboro' Iron are about exhausted, and we do not hear of any being offered at a price likely to attract attention. Scotch is sparingly dealt in, and sells in small lots at \$24.50 @ \$25.50, according to brand. Bessemer is quiet and firm at \$25.50 @ \$26, for shipment, although sales of spot lots have been made during the week at \$25. There is no disposition to urge business in the present condition of affairs; the uncertainty in regard to freights demoralizes the entire market. Heavy losses will be inflicted on parties who are under contract for forward deliveries; freights which, at one time, were 5¢ @ 7¢ per ton, are now 15¢ @ 17¢, and scarce at that.

**Muck Bars.**—The market is steady, with several sales of large lots, within the past two days, at \$45, f. o. b. cars at mill. Holders ask \$45 @ \$46, and are firm at these prices.

**Blooms.**—There is no change in prices, and, with light stocks, there is a good deal of difficulty in placing orders. We quote: Charcoal Blooms, \$72.50; Run-out Anthracite, \$60 @ \$62.50; \$52.50 for Scrap Blooms, and \$47.50 for Northern Ore Blooms.

**Bar Iron.**—There is no change of importance, the general tone of the market being about the same as last week. Stocks are light and prompt deliveries still hard to obtain, but there are indications that mills are catching up with their orders. For delivery during next month and later, orders, to a moderate amount, would be taken at about 2.7¢, at mill, and in some cases buyers intimate that slight concessions have been granted. On the whole the market is very steady, and could hardly be in a more satisfactory condition than it is. Prices range from 2.7¢ at mill to 2.9¢ from store, with somewhat better rates when deliveries are called for at once. The output is very large, and although there is no falling off in consumption, present or prospective, manufacturers are in better shape for meeting the demand than they have been for some time.

**Plate and Tank Iron.**—There is an active demand, and the transactions of the week have probably been a good deal larger than the output. There are no specially large orders that we can hear of, but there is so much demand for small lots that mills are kept full to their utmost capacity. Judging from the number of inquiries which have been made during the past week, there is a vast amount of new business coming on the market at an early date, so that prices are firmly maintained. Sales have been made at the following rates, with slight concessions, possibly for deliveries during 1882, viz.: Tank Iron, 3.50¢; Refined, 4¢; Shell, 4.25¢; Flange, 5¢ @ 5.50¢; and Fire-box, 6¢ @ 6.50¢.

**Wrought Iron Pipe.**—There is a heavy demand, and prices are firm at 40¢ discount on Boiler Tubes, and 55¢ @ 57½¢ on Gas and Steam Pipe.

**Sheet Iron.**—The demand continues without sign of abatement. Manufacturers have nothing to offer, so that prices are entirely nominal. Sales are made at about the following rates, although it is said that any price holders choose to ask would be paid for prompt deliveries:

Common Sheet, No. 27 and 28	3.5¢
Common Sheet, No. 26	3.5¢
Common Sheet, No. 25	3.5¢
Common Sheet, No. 24	3.5¢
Best Refined 1/4 @ 1/2 advance on the above	
Best Bloom Sheets, No. 26 to 28	3.5¢
Best Bloom Sheets, No. 25 to 27	3.5¢
Best Bloom Sheets, No. 24 to 26	3.5¢
Common Red Plates, 3.16 to 16	3.5¢
Blue Annealed, 3.16 to 16	3.5¢
Best Bloom Galvanized, discount	30¢
Second quality, discount	40¢

**Structural Iron.**—There is no change in this department, all the mills being full and not in a position to contract for delivery before 1882. There are many inquiries, and prospects of an enormous demand during the early months of the coming year. Manufacturers are getting in shape for a large output, however, and hope to be in a position to meet the demand. Prices are firm and unchanged, viz.: for spring delivery, say 3¢ for Angles, 3.7¢ for Beams, 3.9¢ for Channels and Tees. Earlier deliveries are quoted at 3.25¢ for Angles, 4¢ for Beams, and 4.25¢ for Channels and Tees. Bridge Plates, 3.25¢; Hammered Axles, 3.75¢; Rolled Axles, 3.4¢.

**Steel Rails.**—It is difficult to say what is being done in this department. Manufacturers claim to be full, but it is intimated that orders are taken once in a while, although particulars are withheld. One reason probably is that they do not wish to make a price for outsiders, and another that orders are entered for regular customers without fixing a definite price. It can easily be understood that with such large concerns as are now in operation, convenience as to time of delivery is an important matter. Where deliveries are stipulated for at a given time, sellers will naturally be exacting as to price, but on order for 20,000 to 30,000 tons, deliverable at their option, is worth a dollar or two per ton to the seller. So far as we have heard of actual quotations, \$62.50 is an inside rate for 1881 deliveries, and \$60 @ \$62.50 for 1882. Foreign Rails, owing to the advance in freights, are quoted at higher prices delivered, with a good deal of hesitation in naming c. i. f. rates at all. A sale of light Rails was made at \$66, delivered at Gulf ports, and it would be difficult to secure any delivery at less than \$62.50, and from that upward, according to date and port.

**Steel Blooms.**—Are entirely nominal, and, so far as we can learn, there is no disposition to do business in the present unsettled condition of the market. There are sellers at \$5.15 @ \$5.17, f. o. b., but on account of high freights no offers are made likely to lead to business.

**Iron Rails.**—There is a good deal of inquiry, but so far as actual business is concerned only small lots have been taken. In this way quite an active business has been done, but at the prices asked—say, \$47.50 @ \$48 for heavy sections, buyers hesitate about closing. Manufacturers cannot make

concessions at the present cost of material, so that business is unsettled for the time being. It is extremely probable, however, that the high rates of freight from England and the crowded condition of the Steel works will force buyers into the market before long. In the meantime we quote: Heavy Rails, \$47.50 @ \$48; Light Rails, \$49 @ \$52.

**Railway Fastenings.**—The demand is large, and Spikes command 3.10¢ @ 3.15¢; Fish Plates, 2.6¢; Bolts and Nuts, 3.25¢ @ 4¢.

**Old Rails.**—The market is quiet, but prices are very firm. Holders ask \$29 @ \$29.50 for Tees, and \$31 @ \$31.50 for Double Heads, but no sales have been made at these prices. Stocks are almost exhausted, and holders appear to have full control of the market, although, as yet, buyers' ideas have not reached over \$29 and \$31. Double Heads are especially scarce, and would sell to a moderate extent at \$31, or perhaps over that for a good delivery.

**Crop Ends.**—Offered at \$26.50. No sales reported within the past week. Buyers could probably be found at about \$26.

**Scrap Iron.**—Scarce and firm. Choice No. 1 commands \$31 @ \$32; Medium, \$29 @ \$30. Foreign for early shipment would cost about \$31. Cast is unchanged at about \$20.

**Nails.**—Prices are steady and unchanged at \$3.30, net.

## PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, Pittsburgh, Pa., Nov. 8, 1881.

The statement of a Cincinnati paper that there is likely to be trouble between Pittsburgh Iron mills and their skilled workmen appears to be without any foundation whatever. Under the sliding scale there can be no trouble, unless it should be ascertained that the mills were realizing more than card rates, which is not the case. So far as your correspondent can learn, not a single one of our millmen here are favorable to advancing the card for the present at least, and the general belief is that it will not be disturbed before January, 1882, if then. If our millmen were acting in bad faith, or exacting more than card rates, there would be some cause to apprehend trouble, but this they are not doing, and have no disposition to do. Manufacturers have good reasons for not advancing prices. Among others, they realize that high prices lead to a reduced consumption, together with enhanced cost of labor, and increases the danger of foreign importations, which they are particularly anxious to guard against. The boom of a few years ago and its bad effects have not been forgotten here, and our manufacturers are very sensibly determined to prevent a recurrence of the same.

**Pig Iron.**—We have to report a quiet, but firm market, and while as compared with a week ago prices remain unchanged, the tendency is still upward. Furnacemen feel that the general situation is in their favor; they realize that the consumption is very large—unprecedented, probably, in the history of the iron trade of Pittsburgh—still they are in sympathy with the mills and are not pushing prices as fast as they might if so disposed. They, as well as the mills, realize the danger of foreign competition, and they are just as anxious to prevent it; hence they are slow about putting up prices, although there is reason to believe that in the present condition a further slight advance of say from 50¢ to \$1 per ton could be established without much danger. The receipts continue liberal, and would be considerably larger but for the want of transportation; however, nearly all that coming forward is being placed on former contracts, having been bought to arrive, and there is little or none going into sale yards, nearly all of which are bare of desirable qualities. We continue to quote Neutral Forge Irons at \$23.50 @ \$24, 4 mos., ditto inclined to Red-short, \$24.50 @ \$25; White and Mottled, \$21 @ \$22. Bessemer is quiet, but firm, with little offering; last sales of No. 1 were at \$28 @ \$28.50, but some of the furnaces are now asking \$30. Foundry Irons may be fairly quoted at \$24 @ \$25, for No. 2 and 1, with some few sales of the latter at \$26 for extra.

**Muck Bars.**—The activity noted for some time past continues, and prices are firm, particularly for immediate delivery. The sale reported at \$47 last week was made under peculiar circumstances, and cannot therefore be regarded as a fair index of the market price. For near-by delivery, \$45 is much nearer the mark than \$47. At the present card for Finished Iron no mill can afford to pay \$47 for Muck—so it is claimed by those who are in a position to know.

**Manufactured Iron.**—Notwithstanding what is usually considered the time for the active season has about passed, there appears to be no abatement in the demand. The turning away of orders is still of common occurrence, and we do not suppose there is a mill in Pittsburgh or vicinity but what is booked for the remainder of the year. The starting up of the Cincinnati mills has had no perceptible effect here as yet, but that it will within the next few weeks be certain, as our mills got large orders during the strike, not only from Cincinnati, but from other points that ordinarily draw their supplies from that city. Prices firm at full card rates; Bars, 2.50¢, rates 60 days; Sheet, on a basis of 4.30¢ for No. 24; Tank, 3.30¢; Boiler Plates, 5.4¢ @ 7.4¢, the latter for U. S. brand. Almost any price could be obtained for Pipe Iron for immediate delivery, as it is badly wanted. Some of the pipe mills are crippled for want of it, and are not able to work up to their full capacity in consequence.

**Nails.**—While ordinarily the busy season is about over by the first of November, such is not the case this year; there is no perceptible abatement in the demand for near-by delivery, and if the weather is at all favorable, this activity will continue all winter. At the present time, we do not suppose there is a mill in the country that has anything like an assorted stock. Prices firm, but unchanged; \$3.15, 60 days, with 2¢ off for cash, for carload lots, and \$3.25 in a jobbing way.

**Wrought Iron Pipe.**—There has been no change in prices for several weeks. The demand continues active, and for immediate delivery better rates than those quoted, we have no doubt, could be obtained. Discount on Gas and Steam Pipe, 55¢ @ 57½¢; on Boiler Tubes, 40¢; Oil Well Casing, 85¢ per foot, net; ditto Tubing, 25¢.

**Rails, &c.**—There have been no recent sales of Steel Rails reported here, in the absence of which we omit quotations. The mills here, as elsewhere, are sold for several months ahead. Railway Spikes are firm, but unchanged, at 3¢, 30 days; Splice Bars, 2.60¢; Track Bolts, 3.75¢ @ 4¢.

**Steel.**—There is a continued steady demand for all grades of Merchant Steel, and the mills have about all they can do comfortably. There has been an unusually active demand for Steel Boiler Plate all this year, and it is now quoted firm at 6½¢ @ 7¢; Refined Cast Steel, best brands, 11¢; Crucible Machinery, 7¢; Open-hearth and Bessemer Machinery, 4½¢ @ 5¢; ditto Spring, 4½¢ @ 4½¢; ditto Tire, 4½¢; ditto Flow, 4½¢ @ 4½¢.

**Scrap.**—There is a fair business in some kinds of Scrap, while others are dull. No. 1 Wrought, \$29 @ \$31 per net ton; Old Boiler Plate, \$30 @ \$32; Car Springs, \$33 @ \$40; Old Car Wheels nominal at \$29 @ \$30, gross; and Crop Ends about the same; Cast Borings, \$14 to \$16, gross; Wrought Turnings, \$20 @ \$22, net.

**Window Glass.**—The striking employees have resumed work at the old wages. There is a continued active demand and prices are firm, but unchanged. In carload lots discounts 60 and 100 and 5¢ on single and 70¢ on double strength, 60 days, with the usual discount of 2¢ for cash.

**Coke.**—This important interest continues very much crippled in consequence of the scarcity of transportation, and the prospect for any immediate relief is not very encouraging. Many large consumers write that they are about out of Coke, and some furnaces have been obliged, so it is stated, to blow out in consequence. A resumption of river navigation would afford relief, but there are many points where the article is badly needed in the interior that are dependent entirely upon the railroads. Prices unchanged; \$1.60 @ \$1.65 per ton, free on cars at ovens; \$1.70 @ \$1.75 for small foundry orders.

**Coal.**—The prospect continues favorable for an early resumption of river navigation, and the coffer dam having been removed out of the way, Coal men are very anxious for a rise, as are also consumers of Pittsburgh Coal all the way from Cincinnati to New Orleans, as stocks in all the down-river markets are very much reduced.

## CHICAGO.

Office of The Iron Age, 36 and 38 Clark Street, cor. Lake



(Revue Internationale.)

BRUSSELS, Oct. 23, 1881.—**Merchants** Iron firm at 13.50. Shares, sheet at 18 to 25.50, and pig iron 15.50. The market is very dull runs upon orders from the States, for both the above. The order seems to last for this winter. Quite a large trade is doing for ex. 20.5; orders from Bolivia are considerable. The market for iron works have been desired a larger dividend in advance. In Belgium, that the Providence pays 100 francs for their share instead of 80 francs last year; Vezin-Aulnoye, 25 instead of 20; Morgan aux Lambris, 15 instead of 10. In Belgium, the market is, on the other hand, the Charrier Iron works have devoted their dividend of 50 to 25, as they have devoted the bulk of earnings to the sinking fund; they have desired a larger dividend in advance. The amounts for the sinking fund, beside paying the above dividends. Prospects in the iron trade are highly encouraging in this country, there being a large stock of iron in the hands of the States. The stock of Pig Iron diminish rapidly, while orders



dropping in all the time. Near Charleroi a blast furnace has just sold thereof 30,000 tons, another one might have made a similar sale, but has declined listening to the current figure offered, because it expects to do so very shortly. In the Luxembourg district, Pig Iron commands 12 @ 53 francs the 100 kgs., and at Charleroi, Common, 52 and Prime, 55 @ 58. Merchant Iron is unusually active, and prices are somewhat higher. Neither in Roumania, is about to get water works, and an adjudication is impending for Iron Tubes for the purpose. Coal.—Although this fuel is very active the price has remained unaltered.

#### BERMANT.

**HAMBURG, Oct. 24, 1881.**—Iron.—We receive the ensuing report from Dortmund: "Animation in the iron trade has not only been unabated, but the demand for Pig Iron, especially for puddling purposes, has even increased in a notable manner. Rolling mills make great efforts to secure their Pig Iron requirements for some time to come, but meet little willingness to accommodate them on the part of blast furnaces. There is also an active demand for Spiegeleisen and Bessemer Pig, and therein, as well as in Puddle Pig, there is an upward tendency. The fact is that present consumption of Pig very much exceeds production. Foundry Pig was also wanted at firm prices. Good orders are received all along for Merchant Iron and coarse Sheets—so much so that at last week's prices hardly any Merchant Iron can now be had. The price may therefore be quoted 12 @ 125 marks per ton. Quite a demand is noticeable for Rolled Wire at an advance. Thin Sheets are rather a little behindhand still in price when compared with coarse, but they also look up. The advance in Spiegeleisen causes a rise in all sorts of galvanized goods. Great activity prevails at the Bessemer Steel works. For the interior there is a good demand for Bessemer Steel Rails and Hoops, and for export for the former. Steel Ingots are taken in large amounts for America. From that part of the world a good many Steel Rail orders have also lately been received. Other branches, on the whole, still quiet. This may be said of boiler makers, machine shops and foundries in particular. All received large orders. The Hardware people have not been left in the cold, except Remscheid-Sollingen, the latter complaining of a lack of orders and unremunerative prices. As for the bridge-building concerns, several of them are less busy, but I hear the locomotive shops and car makers expect a good run of orders. Coal.—There is great activity for domestic use, as well as for export to Holland, Belgium and France. Metals.—Not much has transpired, but the market has been firm. Lead is quiet, still quiet. English Pig, 17 @ 17.50 marks per 50 kilos; ditto Sheets, 17.25 @ 17.50; German Pig, 15.50 @ 15.50; and Spanish, 15.20 @ 15.40. Copper is in demand and Electrolytic has been paid higher. We quote Prontelium, 50 @ 55; Wallaroo, 75 @ 80; Electrolytic N. A., 70 @ 77; and Calumet and Hecla, 74 @ 80; Tin is quiet, but firm; we quote the range, 105 @ 110. Spelter without anything doing; we quote Silesian Slabe, spot and to arrive, 16.25 @ 16.50 marks.

(Cologne Gazette.)

**DUSSELDORF, Oct. 25, 1881.**—Iron.—We receive the ensuing weekly review, dated yesterday, from our special correspondent at Dortmund: "Great animation is noticeable at this iron center; orders are received with the utmost regularity in large amounts. This leads not only to great firmness, but to an upward tendency. Blast furnaces in this vicinity have sold out their entire production to the close of the year, and some have been able to contract their whole output, deliverable at the end of the first quarter of 1882, but most of the furnaces are opposed to selling at such a low price. The rolling mills, on their part, have, on an average, work enough secured to last them from two to three months ahead. The bulk of orders runs on coarse, red iron and rolled wire, but some material for iron steamers and some thin sheets also move off well, but beams are less wanted, since the building season draws to a close and the bridge-making concerns also begin to flag a little in their activity. The steel works are exceedingly busy. From the United States there have been received copious commands for blooms, but the steel-rail orders from there have now almost entirely ceased. For the interior there are, on the other hand, very handsome orders for steel rails, while from Italy there are forthcoming, in the immediate future, very considerable purchases thereof. Thus, the Upper Italian Railway line will want, at once, 35,554 tons of them. On iron sleepers, the works here are, furthermore, very busy. As for small iron foundries, steam boiler and machine shops, all are kept lively to an extraordinary degree. The bridge builders complain of a lack of work, but Holland now appears with an order for three large bridges. Coal—is getting more active daily; the scarcity of cars is much felt."

#### AUSTRIA.

(Austrian Trade Journal.)

**VIENNA, Oct. 23, 1881.**—Iron.—The general situation is highly satisfactory, there still being great activity on all hands. Merchant Iron has undergone no further change, but we hear that the Styrian rolling mills are now more inclined to advance their price likewise. In Hungary blast furnaces intend advancing the price of foundry Pig half a florin per 100 kgs.; other kinds of Pig also tend upward. Fig Iron is generally getting scarcer in the hands of dealers, while blast furnaces are not inclined to go on selling any further at established prices. Hungarian wholesale iron dealers have advanced Sheet Iron for roofing half a florin per 100 kilos, since October 13. A good number of orders are in immediate prospect for domestic lines, including Hungarian State railways. We quote a firm market, Fig. 44; ditto Gray, 46; Bessemer, 48 @ 52; Merchant Iron, 115 @ 120; ditto Bohemian, 100 @ 110; Sheets for locksmiths, 165 @ 175; ditto for roofing, 180 @ 184; ditto for boilers, 160 @ 170; ditto for tanks, 150 @ 160; and beams, 115 @ 120 florins per 100 kgs. Metals.—Not much change has occurred during the week, but the tendency is a decidedly favorable one. We quote toward the close, in florins, per 100 kilos: Copper, 74 @ 90; Tin, 117.50 @ 120; Antimony, 62 @ 65; Lead, 17.50 @ 20; Shot, 25 @ 24.50; Litharge, 20 @ 24; Spelter, 17.50 @ 19.50; Sheet Zinc, 24.50; Nickel, 4.50 per kilo; Bismuth, 12 per kilo; Blue Vitriol, 28 @ 30; Zinc ditto, 14; Green ditto, 4 @ 5; Minium, 25 @ 26; Sugar of Lead, 42 @ 45; Zinc White, Vieille Montagne Green Seal, 44; Red ditto, 34, and Blue Seal, 33.

#### HOLLAND.

(Koch & Vletteroom.)

**ROTTERDAM, Oct. 18, 1881.**—Tin.—After a short halt, the upward movement has been resumed. Banca was thus paid 50.50 guilders per 50 kilos yesterday, and Billiton to arrive 50. At these figures there are more buyers. P. S., Oct. 25.—During the past week the animation previously prevailing has been interrupted and above rates could not be obtained any more. Opinion, however, still favors the metal, in proof of which we may mention that at 50 for Banca and 52.75 for Billiton there are still buyers, but holders ask 50 cents above these figures. Yesterday there was a general determination to await the result of the government Billiton sale at Batavia to come off to-day.

#### EAST INDIES.

(Gillman, Wood & Co.)

**SINGAPORE, Sept. 15, 1881.**—Tin.—A considerable business has been done, mostly by one firm, and the market closes steady at 50 per picul. Sales for the fortnight aggregate 380 tons, the bulk of which is destined for the United States. Freight.—Arrivals of free vessels have been small, and the market is steady. For New York the Elwell has cleared, and no charters have since been made. There is a moderate quantity of cargo offering, and the next vessel laid on the berth should command an advance on last rates paid. There have been no charters for Boston. Exchange is firm at 1/2 for 6 months' par at bills on London. Shipments of Tin from the Straits settlements to the United States have been during the first 8 months 5,712 piculs, against 9,775 last year; 6,814 in 1879; 41,471 in 1878; 14,811 in 1877; and 26,035 in 1876. Since then the Americans took for New York 171 piculs, the Agamemnon 1345, and ditto from Penang 434 piculs.

(Schmidt, Kustermann & Co.)

**PENANG, Sept. 24, 1881.**—Tin.—Our last report bore the date of 14th instant. Since then the mar-

#### Warner's Adjustable Door Hanger

Illustrations of a new adjustable door hanger, now being introduced by Messrs. E. C. Stearns & Co., of Syracuse, N. Y., are shown below. A general view of the hanger is presented in Fig. 2; Fig. 3 shows one of the hangers fitted with an astragal plate for the front edge of the door; Fig. 1 is a vertical section taken near the back of the door, showing the back hanger as fitted and the construction employed for the track. The front and back hangers are connected by a rod shown broken in Fig. 2, thus making the running gear substantial and adequate for the work it is to perform. The hangers are made of wrought and malleable iron, and

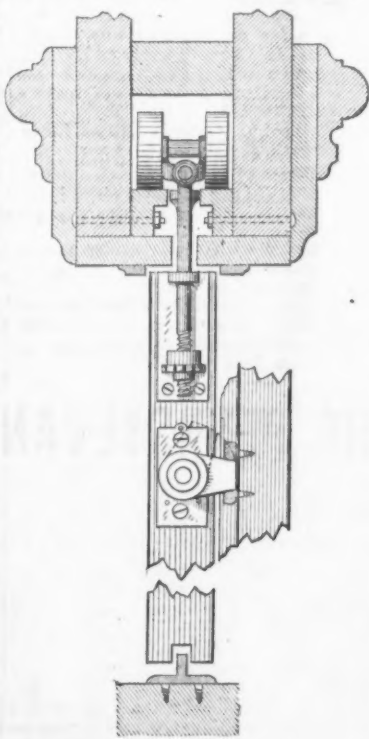
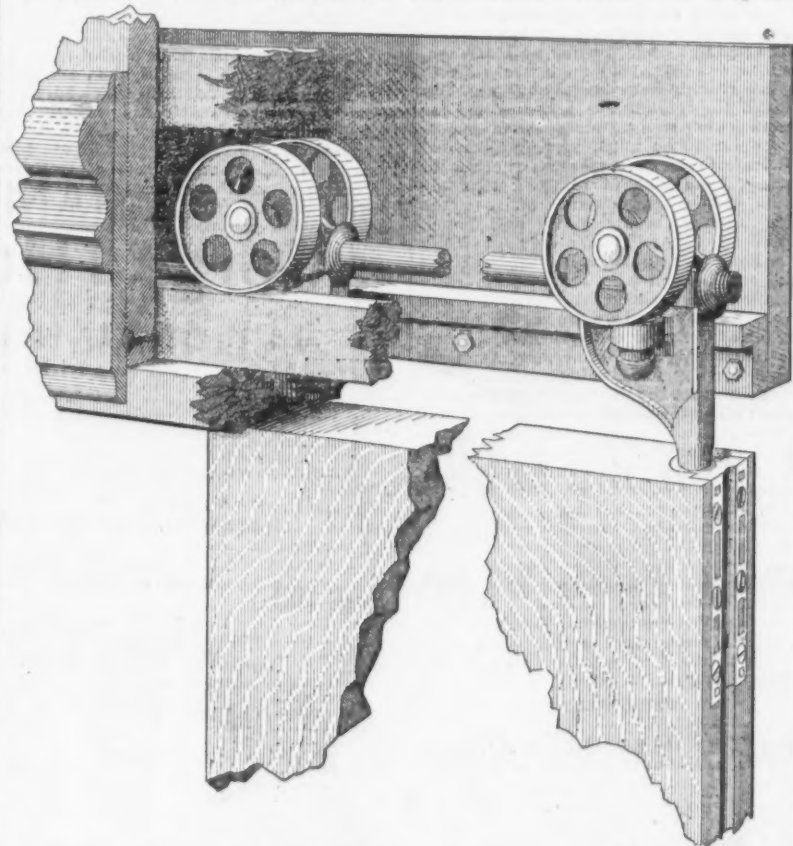


Fig. 1.—Vertical Section at the Back of Door.

in a measure overcome all the objections hitherto pertaining to the running of sliding doors. An important feature is the adjustability. The doors may be raised or lowered by means of the ratchet nuts on the rods of the hangers. One of these is clearly shown in Fig. 1, while that used on the front of the door is indicated in Fig. 3. By this means the door may be raised so as to clear the carpet, or to overcome any sagging or settling



Warner's Adjustable Door Hanger.—Fig. 2.—Perspective View of Construction.

ing of the building after construction. A double track is employed, and by means of a universal joint in connecting the hanger, the carriage is made to conform at all times to the track, causing an equal bearing on both rails. The tracks are made of hard wood, bolted in position as shown in the engravings. The bearings of the hangers being finished and lined with anti-friction metal, are noiseless and require no oiling. No track is required upon the floor, and carpets may be extended through the opening. Short guides are placed in the pockets into which the doors slide. A section of one of these is shown in Fig. 1. A special feature of this apparatus is the gravity stop used upon the back edge of the door, and shown below the hanger in Fig. 1. The object of this device is to prevent the doors running too far into the opening. By inserting a knife blade between the jam and door the stop may be raised, allowing the door to be drawn into the opening for the purpose of adjusting or removing. A rubber bumper is provided for the stop to strike against, and is indicated by the dark shaded portion under the

stop in Fig. 1. The dotted lines show how the stop may be raised by the knife blade, as mentioned. In framing for the reception of these hangers, the general plan followed is indicated in Figs. 1 and 2. A header, as shown, is inserted between the beams in order to keep the studding from spreading

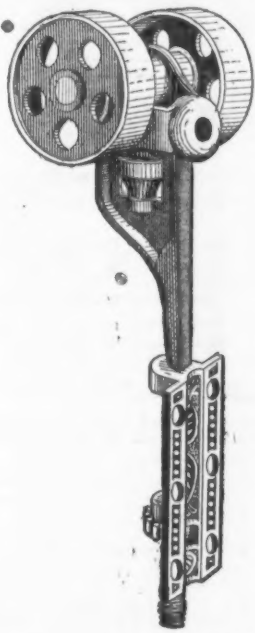


Fig. 3.—General View of Hanger.

or contracting, and to maintain a uniform space between the tracks to prevent binding the small friction roll clearly shown in Figs. 1 and 3. A pocket is provided in framing the track, into which the hangers are inserted when being attached to the door. A special casting accompanies the hangers for use in the construction of this pocket, but which is not shown in the engravings.

#### Cheap Gas for Gas Motors.

Mr. J. Emerson Dowson has recently published a description of an apparatus for producing cheap gas for gas motors, in a paper read before the British Association at York. The apparatus is small in size, easy to work, and gives a stronger gas of uniform quality than any other contrivance heretofore introduced. One of them has been fitted up in the garden of the Industrial Exhibition, and is there making gas for a 3½-horse-power Otto engine. The retort, or generator, consists of a vertical cylindrical iron casing, which incloses a thick lining of ganister, as in a foundry cupola, to prevent loss of heat and oxidation of the metal, and at the bottom of this cylinder is a grate, on which a fire is built up. Under the grate is a closed chamber, and a jet of superheated steam plays into this, and carries with it, by induction, a continuous current of air. The pressure of the steam forces the mixture of steam and air upward

generator; but where uniformity of pressure is essential, as for gas motors, the gas must be passed into a holder. The latter somewhat retards the production, but the steam injector causes gas to be made so rapidly that a holder is easily filled against a back pressure of 1 to 1½ inches of water, and at this pressure the generator can pass gas continuously into the reservoir, while at the same time it is being drawn off for consumption. To produce 1000 cubic feet of gas, only 12 pounds of anthracite are required, allowing 8 to 10 per cent. for impurities and waste. Thus a generator, A size, which furnishes 1000 cubic feet per hour, needs only 12 pounds of coal in that time, and this can be added once an hour or at longer intervals. The cost of making the gas depends on the size of the generator to some extent. The A size is 2 feet in diameter by 3 feet 7 inches high, and is the smallest made for practical work. The actual cost of producing gas in this generator is given in the following table:

	£ s. d.
Anthracite to make gas at the rate of 1000 c. f. per hour = 12 lb. × 9 working hours = 108 lb., or say 1 cwt. at 20/6 a ton.....	0 1 0
Allowance for wages of attendant.....	0 1 0
Repairs and depreciation of generator, gas holder, &c. (5 per cent. on £225) = per working day.....	0 0 5
Interest on capital outlay, ditto ditto.....	0 0 5
Total.....	20 2 10

Gas produced..... 9000 c. f.  
Less gas used for generating and superheating steam..... 1000 c. f.  
Total effective gas for 24/10..... 8000 c. f.  
Net cost, 4½d. per 1000 c. f.

The gas generated is of the following composition (approximately):

	Per cent. by volume.
Hydrogen.....	30
Carbon monoxide (CO).....	30
Carbon dioxide (CO <sub>2</sub> ).....	3
Oxygen.....	3
Nitrogen, &c.....	34
Total.....	100

This gives about 50 per cent. by volume of combustible gases, and the calorific power of 100 liters is 115,836 gram units of heat. Its calorific intensity is 2268° C., corresponding to 4114° F. With this may be compared ordinary coal gas of the following average composition, as given by Dr. Frankland:

	Per cent. by volume.
Hydrogen.....	51.81
Marsh gas (CH <sub>4</sub> ).....	35.25
Olefiant gas (C <sub>2</sub> H <sub>4</sub> ).....	3.53
Carbon monoxide (CO).....	8.95
Carbon dioxide (CO <sub>2</sub> ).....	0.38
Nitrogen.....	0.08
Oxygen.....	0.00
Total.....	100.00

This has a calorific power of 559,038 gram units for 100 liters, and is therefore about 3.5 times greater than that of Dowson gas. Its calorific intensity is 2554° C. (4629° F.)

The comparative explosive force of the two gases, calculated in the usual way, is as 3.4 : 1, i. e., coal gas has 3.4 times more energy than the writer's gas. Messrs. Crossley, of Manchester, the makers of the Otto gas engines, have made several careful trials of this gas with some of their 3½-horse-power (nominal) engines, and in one trial they took diagrams every half hour for three consecutive days. These practical trials have shown that without altering the cylinder of the engine it is possible to admit enough of the Dowson gas to give the same power as with ordinary coal gas. It has been seen that the comparative explosive force of the two gases is as 3.4 : 1; but, as is well known, the combustion of carbon monoxide proceeds at a comparatively slow rate, and for this reason, and because of the diluents present in the cylinder, which affect the weaker gas more than coal gas, experience has shown that it is best to allow five volumes of the Dowson gas for one volume of coal gas, and then the same uniform power is obtained as with the latter.

This gives very important economical results, for if the cost of the Dowson gas, given in the tables as 4½d., 3½d., and 2½d. per 1000 cubic feet, be multiplied by five there will be 18. 9½d., 18. 4½d., and 18. 2½d., or a mean of about 18. 5½d. for the equivalent of 1000 cubic feet of coal gas, which usually costs from 38. to 48., and this represents an actual saving of about 50 to 60 per cent. in working cost. Another practical consideration is that coal gas requires 224 to 250 lbs. of coal per 1000 cubic feet of gas, but the writer's requires only 12 lbs. per 1000 cubic feet, and multiplying this by five to give the equivalent of 1000 cubic feet of coal gas, for engine work, there are 60 lbs. instead of 224 to 250 lbs. This is only 24 to 27 per cent. of the weight of the coal required for coal gas, and in many outlying districts this will effect an appreciable saving in the cost of transport.

The system of underground telegraph connections that has been adopted in Philadelphia is as follows: The trenches, which are dug in the middle of the street, are about 3 feet 9 inches in depth, the bottom and sides being lined with concrete. The tubes, 2 inches in diameter, are placed in these trenches, five in a row, and four rows, one above the other. A compound of pitch and slag is then poured in, until the pipes are covered, after which the top is cemented with concrete. The trenches are finally filled with earth, which is lightly rammed down. Twenty tubes, it is said, will accommodate from 1000 to 1500 wires. Most of the work is done at night. It is reported that underground telegraph lines are also being introduced in Chicago, and that three miles of wire have already been laid.

The "Fountain" engine, with its two-story drivers, has at last been brought face to face with men who know something about engines and their work. It was even to have some work to do, but it has very suddenly gone back to its stable without doing anything. The Pennsylvania Railroad people have had a look at it, and calculated the pressure on the rails too great if it is called upon to pull a train or to do anything beyond running flying light, and they say they wish to be excused. It seems that the idea is an old one, patented by Joseph Neal, of Pittsburgh. We fear Mr. Fountain has not made a revolution in locomotives.

#### INDUSTRIAL ITEMS.

##### MAINE.

At the Katahdin Iron Works the production is greater than that of 1880, about 500 tons per month being turned out now. The product is sold ahead of the production.

##### NEW HAMPSHIRE.

The Swamscot Machine Co., of South Newmarket, are building an engine of 75 horse-power for Wiggins & Stevens, of Boston. They are also building three mangle frames for the Cochecho Manufacturing Co., Dover, and have recently delivered to the print works of that corporation several large color mixers.

##### MASSACHUSETTS.

At Somerset five double puddling furnaces have just been started in the old mill. This is the first time in three years that iron has been rolled in the mill. The flat mill has also started as a large quantity of material is arriving. The Mt. Hope Iron Works are running a day and a quarter, trying to fill orders for nails and plate.

The Lowell Machine Shop, Lowell, is preparing a shipment for Rio Janeiro, where a cotton mill is to be run by Alexander Leslie, formerly of Philadelphia.

The Deane Steam Pump Co., of Holyoke, have doubled their capital stock, and stand ready to still further increase should the present pressure of business continue.

##### RHODE ISLAND.

The Bailey Wringing Machine Co., Woonsocket, manufactures 300 machines per day, consuming for the purpose 1200 pounds of iron and 1500 feet of beech, maple and birch lumber. Seventy hands are employed by the company, who earn from \$2500 to \$3500 per month.

##### CONNECTICUT.

At Rockville, Thompson & Holmes intend enlarging their chuck manufactory. This firm have been unable to keep up with their orders of late, and have been obliged to refuse many orders, although running every night. Among the orders received last week was one for eighty chucks, which will take them three weeks to fill. They have already received a number of large orders from foreign countries.

On account of the manufacture of arms by the government, which spoils the market for military arms, the Sharps Rifle Company announce the discontinuance of their manufactory, which was removed from Hartford to Bridgeport a few years ago. The sale of sporting rifles, too, is insufficient to warrant so large an investment in special machinery.

##### PENNSYLVANIA.

Inadvertently, in our issue of October 27, we made some errors in speaking of the new works erected by Messrs. Thomas Devlin & Co., Lehigh avenue and American street, Philadelphia. Their ground space is 250 feet square, and in addition to the foundry, 155 by 70 feet, they have a four-story office and warehouse, 125 by 70 feet, fronting on Lehigh avenue. In addition to carriage and builders' hardware, and gas and water fittings, they make steel and gray iron castings to order.

Some very rapid carpenter work has been done in the rolling-mill building of the new Scranton Steel Company, of Scranton. The structure was finished last Thursday, and was just seven weeks and three days in building. This building is a combination of five different structures, the entire length being 564 feet, and the extreme width 136½ feet. Besides the work on the building, the managers have almost finished two very large stone buildings, which are to be used for machine shops, foundry and blacksmith shop. Rarely in the history of a new enterprise has the work been pushed with such energy and directness as in this instance.

Stack No. 2 of the Dunbar Furnace Company was blown in on Thursday last and is doing well. The two stacks are now in blast, and will turn out nearly 200 tons of metal per week.

The new lessees of the Hamburg Iron Works, in Berks County (Nevegold, Scheide & Co.), commenced operations on October 31. They will for the present make only muck bar.

The Chester Rolling Mill, in South Chester, is now running night and day, in the manufacture of plate iron, 450 hands being employed. The owners of this mill will have their new furnace, near the mill, in full blast about the 15th inst., when they expect to make about 100 tons of pig iron daily. This furnace is said to be one of the most complete in the country, as every approved improvement known has been introduced. Adjoining the furnace will be the new steel works, now being built, and expected to be in operation early in the coming year. There will be two open-hearth furnaces, each 30 tons capacity. The company owning these works have 15 acres of ground, now nearly covered with buildings. Being near the Delaware, a wharf extending out nearly 400 feet has been constructed for the landing of the ores to be used in the furnace. Adjoining may be found the works of the Chester Pipe and Tube Company, now manufacturing about 20 tons of pipe daily. Below these works are the tanks and stills of the Chester Oil Company, now in full operation and making large shipments to foreign countries from their extensive wharf connected with the works.

One of the busiest places in Chester is Roach's ship yard. The work now under way includes two steamships, each 287 feet long, for the Old Dominion Steamship Company, of New York, to run on their line between New York, Norfolk and Richmond. A first-class passenger and freight steamship, 345 feet long, for C. H. Mallory & Co., of New York, to run on their line between New York and Galveston, is so nearly completed that she will be launched next week. One of the finest ships yet constructed by Mr. Roach is the double-hull steamship for the Old Colony Steamboat Company, and intended for service between New York and Fall River. This ship, which is fast approaching completion, will have two distinct hulls, there being at midship three feet between the outer and inner hulls, and so arranged as to form 65 water-tight compartments. There will also be 19 others formed by bulkheads and collision decks. It is claimed that it will be impossible,



# BRACKET SAWS



are now a staple article in all Hardware Stores. They make trade lively about Christmas time, when it would otherwise be dull. The demand is such that any dealer can sell a few if he has them in stock. During the past six years a great number of saws have been put on the market, of more or less merit, but at present the demand is almost wholly for the Lester and Rogers Saws. The Lester Saw with all of its attachments sells for \$10.00, and the Rogers Saw for \$3.50. These rates seem low, but we are able to sell at such prices Saws which give entire satisfaction, with no come-back on the Dealer.

We are also Headquarters for Saw Blades, Wood, Designs, and all things pertaining to the Bracket Sawing business.

A fair discount to the trade.

MILLERS FALLS CO., 74 Chambers St., New York.

**HEATON & DENCKLA HARDWARE CO.,**  
Hardware Commission Merchants,  
507 Commerce Street, Philadelphia.

E. & G. BROOKE'S "Anchor Brand" Nails, Brads, Spikes, &c.  
MALLORY, WHEELER & CO.'S Door and Pad Locks.  
UNION MANUFACTURING CO.'S Butts.  
AMERICAN SCREW CO.'S Screws.  
D. R. BARTON TOOL CO.'S Edge Tools, &c.  
FRANCE'S Shutter Holders.  
Anti-Window Rattlers, Brass and Nickel-Plated.  
WESTERN FILE CO.'S Cast-Steel Files.  
AMERICAN SHEAR CO.'S Shears and Scissors.  
H. P. NAIL COMPANY'S Wire, Steel, Iron and Brass Nails and Barbed Nails.  
STEELE & SONS' Wrought Handle Sad Irons.

EXCELSIOR MILLS. Genuine Turkish Emery.  
BROWN & BRO.'S Silver Plated Spoons and Forks.  
GAYLORD MANUFACTURING CO.'S Tull, Chest and Cupboard Locks.

AMES' Genuine A Chester Emery.  
COLWELL & COLLINS, NORWAY BOLT CO., Norway Carriage and Tire Bolts.  
PLYMOUTH MILL CO.'S Black and Tinned Iron Rivets.  
AMERICAN MACHINE CO.'S Fluters, &c.  
STUART PETERSON & CO.'S Tinned and Enamelled Ware, &c.

Also a large line of Heavy and Shelf Hardware.



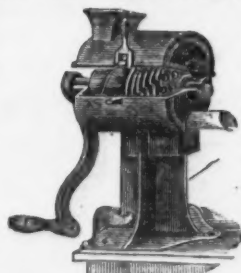
## VARIETY IRON WORKS.

**KYSER & REX,**

Manufacturers of  
Hardware Specialties, Iron Toys, Novelties  
and Housefurnishing Hardware,  
Main Office and Factory, Trenton Ave. and Margaretta St., Frankford, Philadelphia.  
Branch Office, 19 & 21 S. 4th St., Phila. Hardware specialties manufactured to order.

## Kieser's Gem. Kieser's No. 55

Double  
Shearing  
Cut.  
Solid  
Cast  
Steel  
Blades.



Are Made on the Same Principle as  
the Gem Meat Cutters,  
But with capacity to cut 100 pounds  
Pork an hour.

Patented Sept. 24, 1880.  
**Family Meat Cutters are the best made.**  
Every family should have one. Will thoroughly cut Raw or Cooked Beef or Pork, Vegetables, Coconuts, Pine Apples, &c. Will cut forty pounds sausage meat an hour.  
Every Druggist should have one for cutting Roots, Vanilla Beans, &c.  
Easily worked. Easily cleaned. Will not get out of order. Ask your dealer for them.  
Send a postal for Circular with testimonials.  
Will send one as sample by express upon receipt of \$2.00.

Also Sole Manufacturers of

KIMBALL'S PATENT SHOVELS & SPADES,  
BOSS PATENT MOLASSES GATES,  
LOCKWOOD'S PATENT HOES.

**KIMBALL SHOVEL CO.,**

Office, No. 67 German St., Baltimore, Md.

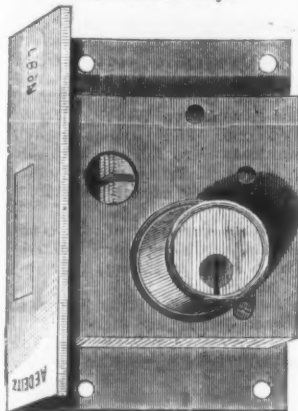
## THE "MOUNT CARMEL" OX SHOE.



Steel Toe Calk.  
FINISHED READY FOR NAILING ON.  
**WARRANTED**  
The Best and Cheapest Shoe Made.  
**IVES, WOODRUFF & CO.**  
Manufacturers,  
MOUNT CARMEL, CONN.  
For sale by dealers in blacksmiths' supplies.

## A. E. DIETZ,

(Successor to Barnes & Deitz.)  
Manufacturer of  
Store Door Locks, Night Latches, Padlocks, Drawer Locks,  
&c., with Flat Steel Keys.



**Durrie & McCarty, Agents.**  
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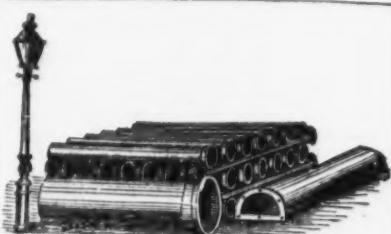
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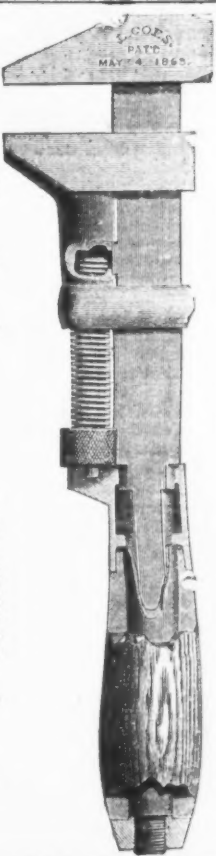
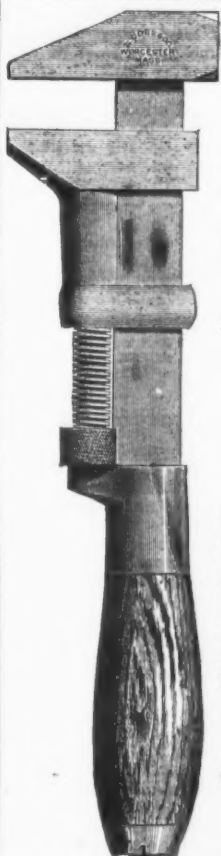
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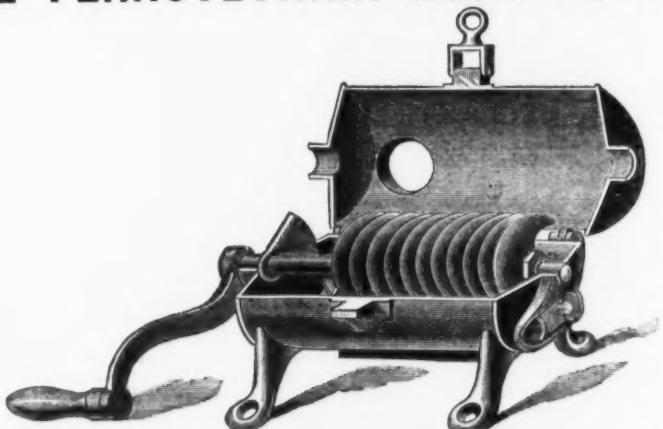
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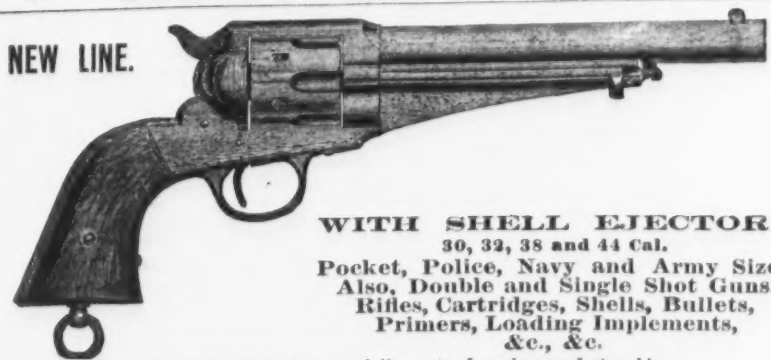
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under most circumstances, either to sink or burn her, as all the machinery and other places where fire will be used will be inclosed with iron. She is 387 feet long and her wheels will be 40 feet in diameter. She is to be supplied with a vertical beam engine, with cylinder 110-inch diameter and 14 feet stroke, the power being about 6000 horse. It is expected that she will be able to run about 22 miles per hour. This steamer, like all those now being constructed by Mr. Roach, will be furnished with electric lights, and no expense is to be spared to make her one of the most complete as well as the most elegant belonging to the company. Her cost will be nearly \$1,500,000. Three other large steamships are to be built, the keels of two of them having already been laid, for service on the west coast of South America. There has been sent from this yard since the 1st of March last seven iron steamers, and by the 1st of next March it is expected that six others will have been transferred to the parties contracting for them.

An execution has been issued against the Allentown Rolling Mill Company by Ario Pardee, the surviving partner of the late Gillingham Fell. The settlement of the estate of the late Mr. Fell rendered the liquidation of his claim of \$1,000,000 (with interest amounting to \$1,343,586) necessary, and on Tuesday the Sheriff of Lehigh County levied upon the stock and property of the company. This action of Mr. Pardee will not (at least for the present) cause the closing of the works, though the property will undoubtedly change hands, and there will probably be loss to the stockholders. Mr. Pardee declares they resorted to these proceedings in order to obtain a legal acknowledgment of their claim, which has been pending for several years. They will assume charge at once and continue filling the orders now on hand as though nothing had occurred. Further than this he declined to say, beyond the fact that none but the original stock and bondholders are affected, as it is nothing but a friendly family issue.

Six of the puddling furnaces at Wheatland have been fired up, with a prospect of the balance speedily following.

The Iowa Wire Works, at Johnstown, Cambria County, were burned to the ground on Wednesday of last week. The fire originated from the explosion of a barrel of benzene, and in an hour the whole works were totally destroyed. All the machinery and a large stock were ruined. The total loss is estimated at \$49,000, almost all of which is covered by insurance. These works were erected in 1878, and were subsequently much enlarged and improved. The number of employees was about 50.

The Lyman-Haskell cannon recently cast at the Scott Foundry, Reading, has been taken from the mold.

The new Colebrook Furnaces at Lebanon, owned by Robert H. Coleman, and consisting of two stacks each 52 by 15, were blown in on the evening of Nov. 1st, and will be in full operation this week.

The Connellsville Machine and Car Co. have orders for 15 more tons of wrought forgings for the Pittsburgh and Western railroad. They are refusing orders for cars every day, having as much to do in that line as they can handle.

At the nail factory of the E. & G. Brooke Iron Company, at Birdsboro, there was manufactured in the month of October 20,310 kegs of "Anchor" brand cut nails. The shipments to numerous customers aggregates the large amount of 20,597 kegs. This is the best showing the factory has made for some time, the irregularity in the running of the works occasioned by necessary repairs, preventing a large yield. No. 2 blast furnace of this company, recently put in blast, is working very satisfactorily.

The rail mill of the Allentown Rolling Mill Company has suspended work for two weeks in order to have a new shaft put in the fly wheel. This job will require work night and day for the whole time of the stoppage. The sale is reported of the Bakewell tract, a large body of coal lying opposite Monongahela City. The purchaser is James O'Neil, a well-known coal operator of the Monongahela valley. The Monongahela City Republic says extensive works will be put up and the mines largely operated in the early spring.

Another large enterprise in the coal and coke industry has been organized in the shape of the Kiskiminitas and Westmoreland Coal and Coke Co. This company owns 2400 acres of coal land in the Kiskiminitas Valley, and propose to open the coal and build 500 coke ovens at once.

The Pennsylvania Crushed Coke Co., whose crusher is located at the standard mines, near Connellsville, is turning out six cars of crushed coke per day.

#### PITTSBURGH AND VICINITY.

The Elba Iron and Bolt Company are erecting a battery of new boilers at their works in Frankstown.

J. Painter & Sons are about to add 15 new puddling furnaces to their mill. This will give them about 70 furnaces in all.

A committee of workmen, recently employed at Tibby's glass works, in this city, are negotiating with parties in Ottawa, Ill., to secure a location in that neighborhood for the purpose of building a factory to be run on the co-operation basis. A gentleman writing from Ottawa to induce the committee to decide on that place says: "I can guarantee you sand enough for nothing, and sand of the best quality put into the works for 40 cents per ton. The window glass works here make glass that is not surpassed by any firm in America, with slack coal at 50 cents per ton delivered. There are two railroads, and a canal runs through the town. The railroads will put switches into the works, and they have cheap freight to Chicago, Peoria, St. Louis, Kansas City and the West. Five acres will be donated and such other assistance given as will be satisfactory to any party coming here with a legitimate enterprise."

The Independent Glass Co. are running half time on chimneys. There is a great scarcity of this article in the market at present.

In the suit of Nimick & Co., of Pittsburgh, vs. the Mingo Iron Works, at Wheel-

ing, an action in chancery to recover a debt, the point has been raised that the West Virginia stockholders cannot be held by the Ohio law making stockholders of joint stock companies liable in double the amount for the corporation's debts. A large amount of money is involved, and this, with the novel question raised and the number of interested parties, makes the suit of more than ordinary importance.

A large fire occurred on the night of the 1st, at the lower works of Oliver Bros. & Phillips, in Allegheny, which resulted in the total destruction of their hinge factory. The flames originated in that part of the works, and would have been checked but for the lack of water. As it was, the firemen were only able to keep the fire from spreading to the large rolling mill of the firm, immediately adjacent. The factory was 125 x 50 feet, two stories, and was entirely consumed, together with a large amount of stock. The loss is estimated at between \$40,000 and \$45,000, on which there is \$25,000 insurance, divided between home and foreign companies. The origin of the fire is unknown. The firm intend to rebuild immediately.

The Crescent Glass Works of Thomas Evans & Co. is only partially working, on account of the boys being out.

Messrs. Graff, Bennett & Co., proprietors of the Clinton Mill, contemplate increasing the facilities for the manufacture of muck iron in the puddling department, by the addition of 10 new puddling furnaces.

The secretary of the Manchester Iron and Steel Company, owners of the old Superior Mill, in Allegheny, occupied by Klonan & Co., informs us that he has heard nothing regarding the reported sale of the mill property to the Baldwin Locomotive Works, of Philadelphia, and their intention to remove their Philadelphia works to that site, and says that the "authoritative statement" is, as far as he knows, untrue.

#### KENTUCKY.

The Mahoning Valley Iron Company have leased the entire Hubbard Rolling Mill for a year, with the privilege of purchasing it at the end of that time. The establishment will be started in full blast next Monday.

The Pine Grove Furnace is doing well, averaging about 18 tons daily.

Bellaire Furnace will not be ready to start up for a month yet. The stack, which is 66 feet high, has to be rebuilt.

At a meeting of the directors of the Lawrence Furnace Company, held Saturday, October 29, it was decided to run Monitor next year and let Lawrence remain idle.

The New York and Ohio Iron and Steel Company, Ironton, expect to put their mill in operation next week, and run to their full capacity in all departments.

The Elyria Shear Company have plans drawn up for extensive works which they will build in the spring. The company were established in 1878, and their business has increased every year. At present they employ 70 hands, and will double their capacity in the spring. They are the sole manufacturers of Hatch & Clausen's patent steel blade shears and scissors, in which they have a large trade.

A new factory for the production of flint prescription vials, bottles and flasks, is in course of erection at Bellaire, the foundations being partially built. This new firm will be known as the Bellaire Bottle Company.

The rolling mills of Cincinnati are starting up again, now that the strike is ended, and all will, probably, go into active operation soon.

The Bridgeport Brass Company are driven with orders, and had they double their capacity they could use it to good advantage. They have added to their works a brick building, 154 x 45, three stories, and are putting in a new Wheelock engine, 300 horse power, and are employing about 250 hands.

The new spiegel furnace at Brier Hill is at present running on foundry iron, turning out about 20 tons per day. In a short time it will be put on spiegel.

A portion of the inwall of the Hecla Furnace fell in last week, making it necessary to shovel out the furnace. While repairing the inwall, they will also put in a new hearth. They will, likely, resume about the 15th of the month.

The foundry and machine shops of Boyce & McBane, East Liverpool, which were recently destroyed by fire, are being rebuilt, and will be completed next week.

Mr. John D. Wick has withdrawn from the iron firm of Wick, Arms & Co., at Youngstown, having sold his interest to W. H. Baldwin. The firm will be Arms, Baldwin & Co.

The furnace of the New York and Straitsville Coal and Iron Company is under the supervision of Mr. Robert Adams, an old Pittsburgh foundryman. The furnace has a 50-foot stack, 14½-foot bosh and seven tuyeres. It has been operated very successfully for several years past, making from 30 to 35 tons of No. 1 iron daily.

#### WEST VIRGINIA.

During the past week work has been rushing at Sweeney's foundry. Thursday night a large roll, weighing 8000 pounds, was cast for the Belmont Mill. Last evening a 4-ton fly-wheel was cast for the flouring establishment of Loudenslager & Son, of Cameron. To-day a large driving-wheel will be cast for Hamilton & McGranahan. During next week some very heavy machinery for the sugar refinery will be cast, and a complete set of machinery for a flouring mill at Shinnston will be shipped. In the boiler yard work is being pushed on the water works boilers. In connection with this, a pair of shears was put in last week for bevelling the edges of boiler plates, thus saving a good deal of time and expense.—*Wheeling Intelligencer.*

The mill of the Laughlin Nail Company, Wheeling, now being rebuilt, will, it is expected, be ready for the puddlers to recommence operations by the middle of this month.

The old Moundsville mill will, probably, be running soon. Several millmen of Wheeling, who have been engaged by the manager, go there this week. The mill is now owned by the Klonans, of Pittsburgh.

#### ILLINOIS.

The Northwestern Screw Company is the name of a new industrial enterprise in Chic-

ago, with a capital of \$50,000, and C. P. Wardell, H. W. Hinckley and John S. C. Keith as incorporators.

The Chicago Bolt and Nut Company has been organized with a capital of \$200,000 and W. B. Howard, D. C. Bradley and J. M. Flower as incorporators.

The rumor regarding the establishment of extensive locomotive works somewhere in the vicinity of Pullman, took shape in the incorporation during the past week of the Chicago Locomotive Works, with a capital of \$1,000,000. The persons applying for the certificate were John T. McAuley, Dyke & Co., Mr. D. T. Tripp, general solicitor for the Grand Trunk Road, and Mr. Charles Howard.

Two of the furnaces of the Union Iron and Steel Co., Chicago, are banked up for want of coke to run them, and the third is barely running.

The total amount of the capital stock of the Rockford Sewing Machine Company, \$100,000, has been subscribed, and the stockholders will hold a meeting next week to organize.

The American Construction Co., of Chicago, was incorporated during the past week. Capital \$75,000; incorporators, A. B. Mason, R. H. Mason and Milton Weston.

Wm. McGregor & Company are placing in the new boilers in the Calumet Iron and Steel Co.'s Works at Irondale.

#### WISCONSIN.

The Racine Hardware Company are about to put up a large building, 100 x 32 feet, in addition to their foundry. Also a building for their two new boilers which are to be put in.

A project is on foot to start a sewing-machine manufactory at La Crosse, with a capital of \$200,000.

The walls of the addition to the Whittaker Engine and Skein Works, at Kenosha, are completed and being roofed over.

#### KENTUCKY.

Ashland Furnace is working most satisfactorily, and made last week a daily average of 54 tons of superior iron, using all raw coal for fuel.

The Norton Iron Works furnace averaged last week about 50 tons of iron per day. The nail factory made 4373 kegs of nails, and shipped during the same time 7500 kegs to fill orders.

#### DAKOTA.

A company to put in smelting works is talked of at Deadwood. It is estimated that the required works would cost \$15,000.

#### MICHIGAN.

Articles of association for car works at East Saginaw have been perfected, and stock is now being subscribed.

The Muskegon Car and Engine Works, organized six months ago, expect to complete 100,000 worth of work this season. Its monthly payroll is now \$4000. They have a contract for 900 cars for Western railroads.

#### COLORADO.

A charter was granted recently to the Como Iron, Coal and Land Co., which intends to operate in Park County, Col. The property includes 50 acres of iron and about 320 acres of coal lands.

#### Competitive Test of Rock Drills.

An interesting trial of rock drills was made at the Cardiff Exhibition, on September 24, before Mr. Geo. H. W. Galloway, M. E., and Mr. Robert Hooper, as representatives of the Southern committee, and Messrs. Hood, Southern, Vyvyan, Beith and other mining engineers. Trials were made with the Normandy rock drill and air-compressor, exhibited by Messrs. Normandy, Stillwell & Co., of London; the Eclipse rock drill and Reliance air-compressor, exhibited by Messrs. Hawthorn & Co., of London; and the Beaumont rock drill, which was worked by a Sturgeon's improved trunk air-compressor, exhibited by Messrs. Thwaites Brothers, Bradford. The trials were all made on a block of Cornish granite and with the following results: Normandy perforated 10½ inches deep in 2 mins. 25 secs. Eclipse perforated 10½ inches deep in 2 mins. 25 secs. Beaumont perforated 7½ inches deep in 2 mins. 30 secs.

The Beaumont drill was obliged to be stopped at 7½ inches deep because of some failure in the mechanism. The Normandy drill and compressor, which, therefore, gave the best results, have also the advantage of being less than half the price, and their superiority appears to be due to the great simplicity of their construction, which differs considerably from all other similar machines, in that they are both valveless, and consequently they can be efficiently worked at a quicker speed than usual, without fear of the evils always resulting from the use of valves, especially at high speed. These machines have won two gold medals at the recent Melbourne Exhibition, as their simplicity has brought them into great favor in Australia, where, as is well known, any attention or repairs requiring skilled labor is excessively expensive. The Normandy rock drills are stated to strike about 800 blows per minute, but at the trial the speed was too great to be counted in the usual way, and no doubt this great speed was due to the absence of all valves and to their only having one moving part—the piston.

#### A Canal Boat Propelled by Air.—A

novelty in canal boats lies in Charles River, near the foot of Chestnut street, which is calculated to attract considerable attention. It is called a pneumatic canal boat, and was built at Wiscasset, Me., as devised by the owner, Mr. R. H. Tucker, of Boston, who claims to hold patents for its design in England and the United States. The specimen shown on Charles River, which is designed to be used on canals without injuring the banks, is a simple structure, measuring 62 feet long and 20 wide. It is 3 feet in depth and draws 17 inches of water. It is driven entirely by air, a Roots blower No. 4 being used, the latter operated by an 8-horsepower engine. The air is forced down a central shaft to the bottom, where it is deflected, and being confined between keels, passes backward and upward, escaping at the stern through an orifice 19 feet wide, so as to form a sort of air wedge between the boat and the surface of the water. The

force with which the air strikes the water is what propels it. The boat has a speed of four miles an hour, but requires a 33-horsepower engine to develop its full capabilities. The patentee claims a great advantage in doing away with the heavy machinery of screws and side wheels, and believes that the contrivance gives full results in proportion to the power employed. It is also contrived for backing and steering by air propulsion.—*Boston Journal.*

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Smith Smith Co., Springfield, Vt. 36  
**Solder.**  
S. S. Smelting Works, Philadelphia, Pa. 36  
**Speaker.**  
Graham & Squier, 111 Liberty, N. Y. 2  
Osmond F. & Co., Bergen Port, N. J. 36  
**Speleogens.**  
Kerschlein & Jock John, N. Y. 36  
Wright Peter & Sons, Philadelphia 36  
**Spoons.**  
Hill, Booth & Hayden & Chambers, N. Y. 36  
**Springes.**  
Cary & Moen, 34 W. 20th, N. Y. 36  
Gautier Steel, Johnstown, Pa. 36  
Goulding & Harvey, Frankford, Phila. 36  
**Stamps, Punch.**  
Michael A. M., Albany, N. Y. 36  
**Steam Drivers.**  
Phillips & Schler, N. Y. Co., 821 Cherry, Philadelphia 36  
**Steam Hammers, &c., Makers of.**  
Smith & Elschlager, Philadelphia 36  
Dugdale Richard, 21 Columbia, N. Y. 36  
**Steam Pumps, &c., Manufacturers of.**  
Cameron A. S., East 2d, N. Y. 36  
Dugdale Richard, 21 Columbia, N. Y. 36  
Brooklyn, N. Y. 36  
Crane Bros. Mfg. Co., Chicago, Ill. 36  
Gardner & Sons, New York, N. Y. 36  
Storer & W. 129 N. 3d, Philadelphia 36  
The Norwalk Iron Works Co., So. Norwalk, Ct. 36  
**Steel.**  
Providence Steam Trap Co., Providence, R. I. 36  
**Steel Importers.**  
Carr J. & Kiley, 30 Gold, N. Y. 36  
Robson, Francis, 301 E. 2d John, N. Y. 36  
McCoy & Sanders, 13 Duane, N. Y. 36  
Peters & Co., 21 Broadway, N. Y. 36  
Gardner & Sons, New York, N. Y. 36  
**Steel (Mushet's Special).**  
Hubbard Chas., 49 Cliff, N. Y. 36  
Hubbard Chas., 49 Cliff, N. Y. 36  
**Steel Manufacturers.**  
Albany & Rensselaer Iron & Steel Co., Troy, N. Y. 36  
Phillips & Schler, N. Y. Co., 821 Cherry, Philadelphia 36  
Chrome Steel Works, Brooklyn, N. Y. 36  
Cleveland Rolling Mill Co., Cleveland, O. 36  
Gardner & Sons, New York, N. Y. 36  
Midvale Steel Co., Nictown, Phila., Pa. 36  
Navy & Co. John, N. Y. 36  
Pennsylvania Steel Co., 228 S. 4th, Phila. 36  
Rowland Wm. & Harvey, Frankford, Phila. 36  
Sanderberg Geo. & Co., 6 Gold, N. Y. 36  
Smith, Sutton & Co., Pittsburgh, Pa. 36  
Singer, Simick & Co., Pittsburgh, Pa. 36  
Standard Steel Works, Philadelphia, Pa. 36  
The Siemens Anderson Steel Co. 36  
Wardlaw S. & C., Sheffield, England. 36  
**Steel Spiral Springs, Manufacturers of.**  
Wardlaw S. & C., Sheffield, England. 36  
**Stocks and Dies.**  
Wiley & Russell Mfg. Co., Greenfield, Mass. 10  
**Stoppers, Black Lead.**  
Stanton Crucible Co., Clinton, Mass. 10  
**Storage.**  
Union Storage Co., Pittsburg, Pa. 4  
**Stoves.**  
H. R. Torrey Razor Co., Worcester, Mass. 10  
**Stove Boards, Manufacturers of.**  
Stanton Crucible Co., Clinton, Mass. 10  
**Stove Repairs.**  
Stanton W. C., Chicago, Ill. 10  
**Stove Trains.**  
Tucker & Dorsey, Indianapolis, Ind. 10  
**Tacks.**  
American Tack Co., Fairhaven, Mass. 8  
Cobb & Drew, Plymouth, Mass. 8  
Dunbar, Hobart & Whidden, 39 Warren, N. Y. 13  
Grundy & Sons, Falmouth, Mass. 13  
Grundy & Sons, 165 Greenwich, V. Y. 12  
Phillips E. & Son, 201 N. 3d, New York, N. Y. 13  
Stanton W. C., Birmingham, Ala. 13  
**Taps and Dies.**  
Carpenter J. M., Pawtucket, R. I. 13  
H. R. Torrey Razor Co., Worcester, Mass. 10  
Wells Bros. & Co., Greenfield, Mass. 10  
Wells & Russell Mfg. Co., Greenfield, Mass. 10  
Olson Julius & Co., Philadelphia, Pa. 17  
Riehle Bros. & Co., Philadelphia, Pa. 17  
H. G. Taylor Co., Philadelphia. 3  
**Tin Ware, Stained and japanned.**  
Shepard Sidney & Co., Buffalo, N. Y. 3  
**Tire Upsetters.**  
Tromb E. F., Flattsburgh, N. Y. 3  
**Tobacco Cutters.**  
Adams F. & Co., Limited, Erie, Pa. 18  
American Tool Co., 116 Chambers, New York. 10  
**Tools, Holders.**  
Satter, W. C., Pearl, N. Y. Pine, N. Y. 36  
**Tools, Steam and Gas Fitters.**  
Armstrong F. J., Bridgeport, Ct. 36  
B. Saunders & Sons, Conkers, N. Y. 36  
**Torches.**  
Dangler V. S. & Refining Co., Cleveland, O. 36  
Lee E. S. & Co., Rochester, N. Y. 36  
**Tree Pruners.**  
Penfield Rock Co., Lockport, N. Y. 36  
**Trey Squares, Bevels, &c., Makers of.**  
Penfield Rock Co., Lockport, N. Y. 36  
**Tube Cleaners, Steel.**  
The Chalmers-Spence Co., foot 6th St., E. R., N. Y. 36  
Dugdale Richard, 21 Columbia, N. Y. 36  
**Tubes, Telescope.**  
Penfield Rock Co., Lockport, N. Y. 36  
**Tubing.**  
Merchant & Co., 67 Market, Phila. 36  
Penfield Rock Co., Lockport, N. Y. 36  
Morse Twist Drill & Mach. Co., N. Bedford, Mass. 36  
**Unroisterers' Goods.**  
Penfield Rock Co., Lockport, N. Y. 36  
**Valves, Gas, Water and Steam.**  
Curtis Regulator Co., Boston, Mass. 36  
Penfield Rock Co., Lockport, N. Y. 36  
Mohaw & Hudson Mfg. Co., Waterford, N. Y. 36  
**Vices.**  
Hermann & Co., 101 Duane, N. Y. 36  
Burnham L. G. & Co., Burlington, Vt. 36  
Cheney L. & Co., Detroit, Mich. 36  
H. R. Torrey Razor Co., Worcester, Mass. 10  
Hewitt Falls Co., 74 Chan Bern, N. Y. 36  
Nelson & Vandys, Philadelphia 36  
**Weather Strips.**  
Dennis & Co., Chicago, Ill. 17  
**Wires.**  
E. E. Barnum's Wire and Iron Works, Detroit, Mich. 3  
**Wheels, Railroad.**  
H. R. Torrey Razor Co., Worcester, Mass. 10  
Whitney A. & Sons, Philadelphia 36  
**Whetstones.**  
Penfield Rock Co., Lockport, N. Y. 36  
**White Lead.**  
Brooklyn White Lead Co., 183 Front, N. Y. 36  
Jewett John & Sons, 183 Front, N. Y. 36  
Lewis John & E. Bros., 23 S. Front Phila., Pa. 36  
Hugunin R. B., Hartford, Ct. 36  
**Window Cleaners.**  
Hugunin R. B., Hartford, Ct. 36  
**Window Springs, Makers of.**  
Hammond W. N., Lewisberry, Pa. 10  
Cary & Moen, 34 W. 20th, N. Y. 36  
Cleveland Rolling Mill Co., Cleveland, Ohio. 36  
Gautier Steel, Johnstown, Pa. 36  
Gilbert & Bennett Mfg. Co., 271 Pearl, N. Y. 36  
H. R. Torrey Razor Co., Worcester, Mass. 10  
Hernheim L., 105 John, N. Y. 36  
Howard & Morse, 15 Fulton, N. Y. 36  
Mound City Barbed Fence Co., St. Louis, Mo. 36  
Presting vee, W. & Co., Holyoke, Mass. 36  
Trenton Iron Co., Trenton, N. J. 36  
Washburn & Moen Mfg. Co., Worcester, Mass. 36  
**Wire Cloth.**  
E. E. Barnum's Wire Works, Detroit, Mich. 3  
Gilbert & Bennett Mfg. Co., 271 Pearl, N. Y. 36  
**Wire Nails.**  
H. R. Torrey Razor Co., Worcester, Mass. 10  
Dunbar, Hobart & Whidden, 39 Warren, N. Y. 13  
H. R. Torrey Razor Co., Worcester, Mass. 10  
Hill Co., Cleveland, Ohio. 36  
**Wire Rope, Iron and Steel, Makers of.**  
H. R. Torrey Razor Co., Worcester, Mass. 10  
Hazard Mfg. Co., Wilkesbarre, Pa. 36  
John A. Koebling & Sons Co., Trenton, N. J. 36  
H. R. Torrey Razor Co., Worcester, Mass. 10  
**Wood-Working Machinery.**  
Rogers J. F. & Co., 109 Liberty, N. Y. 36  
W. G. Wood & Co., Albany, N. Y. 36  
**Wrenches, Manufacturers of.**  
Bemis & Call, Weld & Tool Co., Springfield, Mass. 36  
Coe L. & Co., Worcester, Mass. 36  
Girard Wrench Mfg. Co., Girard, Pa. 36  
Alexander T. J., Boston, Mass. 7  
Powers & Wm. Co., Cincinnati, O. 36  
E. E. Barnum's Wire and Iron Works, Detroit, Mich. 3







# EDWARD MILLER & CO.,

MERIDEN, CONN., Manufacturers of

## Sheet Brass, Cast Brass, Brass Kettles, Machine Oilers, Lanterns,

KEROSENE LAMPS AND TRIMMINGS, TINMEN'S TRIMMINGS, &c.

Warehouse, - - 35 Warren Street, - - NEW YORK.

### AKRON IRON COMPANY,

AKRON, OHIO,

Sole Manufacturers of

## Patent Hot Polished Shafting.

Medal of Superiority awarded at American Institute Fair of 1880.

This Shafting is superior to any in the market, and commends itself to the trade for the following reasons, viz:

- 1st. It is perfectly straight and round.
- 2d. It can be finished accurately to any desired gauge.
- 3d. It will not rust or tarnish easily.
- 4th. It will not warp or spring in key seating.
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- 6th. The peculiarity of its manufacture is such as to entail loss in making it, if other than superior stock is used. Those purchasing it may therefore be assured of receiving first-class material.

Price lists, catalogues and references furnished on application.

Where parties desire it we cut keyways or splines any length required, at a moderate charge.

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AGENTS:

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S. E. BLISS, 89 Lake Street, Chicago, Ill.  
D. N. BROWN MACHINERY CO., St. Louis, Mo.  
J. H. KERRICK & CO., Indianapolis, Ind.  
JOSHUA HENDY, San Francisco, Cal.

### TRENTON LOCK & HARDWARE CO.,

TRENTON, N. J.

MANUFACTURERS OF

## DOOR LOCKS AND HARDWARE,

BRONZED IRON AND BRONZE METAL DOOR TRIMMINGS, BUTTS AND HARDWARE.

CAST BUTTS, DOOR BOLTS, WELL WHEELS, FLUSH BOLTS, SHUTTER BOLTS, PAD LOCKS, BARN DOOR HANGERS, & RAIL, CRINDSTONE FIXTURES, SCREW & SIDE PULLEYS, NOISELESS PULLEYS, HAY FORK PULLEYS, SHELF BRACKETS, PHILADELPHIA SLIDING DOOR HANGERS AND RAIL.

Having largely increased our facilities and line of goods, we invite the attention of the Trade.

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## Wrought Iron Butts, Hinges

## DOOR BOLTS,

Plain, Japanned, Bronzed and Plated.

FACTORIES:

WAREHOUSE:

New Britain, Connecticut. 79 Chambers St., New York.

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Manufacturer of Patent

**BRASS PAD LOCKS**

For Railroad Switches, Freight Cars, and the Hardware Trade. All sizes, with Brass and Steel Keys, with and without chains.  
Patent Horizontal Rim Cylinder Night Latch.  
Self-adjusting to doors of any thickness, with Patent Stop and Drawer Back Knob.  
PASSENGER CAR LOCKS, Bronzed, Nickel-Plated and Japanned.  
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**PATENT COMBINATION WRENCH.**

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.

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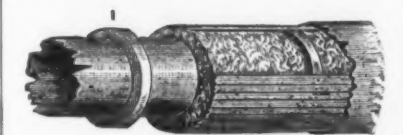
**BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass.**

### GUN POWDER.

Lafin & Rand Powder Co.

No. 99 Murray Street, New York,  
Manufacture and sell the following celebrated brands of Sporting Powder known everywhere as  
**ORANGE LIGHTNING,**  
**ORANGE DUCKING,**  
**ORANGE RIFLE**  
more popular than any Powder now in use.  
Blasting Powder and Electrical Blasting Apparatus.  
Military Powder on hand and made to order.  
SAFETY FUSE, FRICTIONAL & PLATINUM FUSES.  
Pamphlets showing sizes of grain sent free.

### Mineral Wool.



A fibrous material, enclosing about 90 per cent. of its volume of air, and therefore a superior

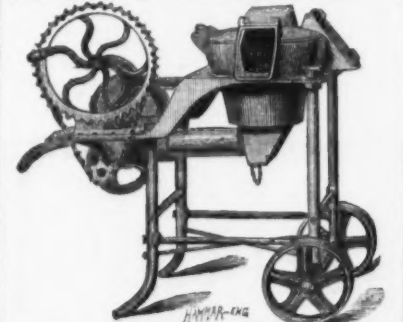
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Being made from the slag of blast furnaces, it is fire-proof and durable in contact with heated surfaces. Readily applied.  
Heaviest grade about 25 lbs. per cubic foot. Price, 1 cent per lb.

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**KEYSTONE RIVETING FORGE.**



An Improved Pattern.  
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**BEST IN THE MARKET.**  
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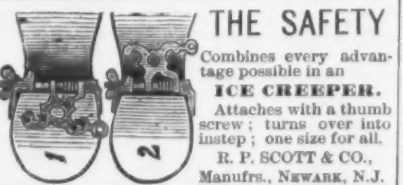


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Manufacturer of  
Sprout's Double and Single Shear  
**Horse Hay Forks**  
And  
Sprout's  
HAY ELEVATORS,  
PULLEYS AND GRAPPLES.  
Send for Circulars.  
Munsey, Lycoming Co., Pa.



**WM. ESTERBROOK,**  
Wholesale Manufacturer of

**Coal Hods,**  
311 Cherry St., PHILADELPHIA.



**THE SAFETY**  
Combines every advantage possible in an  
**ICE CREEPER.**  
Attaches with a thumb screw; turns over into instant; one size for all.  
R. P. SCOTT & CO.,  
Manufacturers, NEWARK, N. J.

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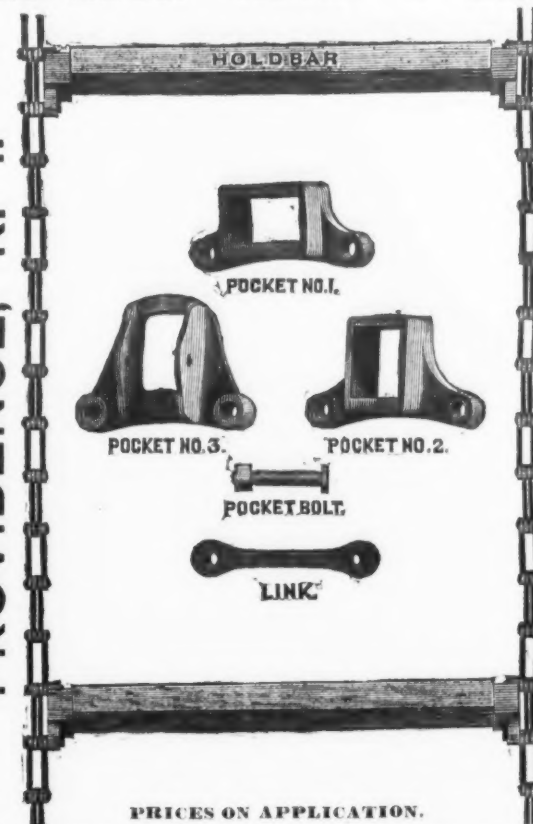
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Horizontal, Vertical and Locomotive Tubular Boiler, from 3 to 60 H. P., in stock and larger to order. Engines all sizes. Pumps, Heaters, Injectors, steam and hand Brick and Mortar Hoists, Boiler Test Pumps. The new Gravity Coffee Roaster. All of the above constantly kept in stock. Send for circular and price list.

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Repairs for Stoves made at Troy, Albany, Rochester, Cleveland, Buffalo, Boston, St. Louis, Quincy, Chicago, Milwaukee and elsewhere, at  
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### ICE ELEVATOR CHAIN & BLOCKS.

PROVIDENCE TOOL CO.,  
PROVIDENCE, R. I.



HENRY B. NEWHALL, J. H. WORK, S. H. & E. Y. MOORE,  
105 Chambers St., 13 Pearl St., 103 & 105 Lake St.,  
NEW YORK AGENT. BOSTON AGENT. CHICAGO AGENT.

PRICES ON APPLICATION.

### THE GENUINE STEBBINS MOLASSES & OIL GATES,

MANUFACTURED ONLY BY

**E. STEBBINS MFG. CO.**

BRASS FOUNDERS AND FINISHERS.

Sole Manufacturers

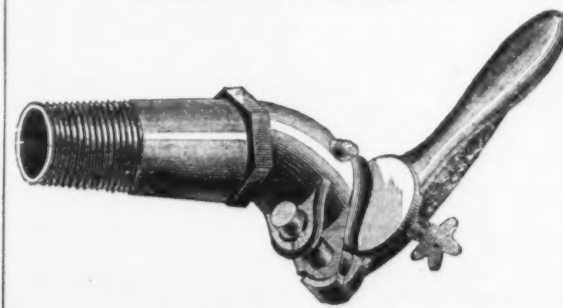
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COMPRESSION

AND GROUND KEY WORK.

Send for circular and price list.

H. M. BREWSTER, Agent,  
Brightwood P. O., Mass.



Office of **NELSON LYON,**  
SOLE MANUFACTURER OF  
**Lyon's Patent Metallic Heel Stiffeners,**  
Also, Manufacturer of  
**BRUSHES**  
Of Every Description,  
Nos. 17 & 19 Green St.,  
Albany, N. Y., Dec. 8, 1880.

To All Whom it May Concern:

To-day a decree in my suit against G. T. Fisher & Co., of Detroit, for an infringement of my patent, was made and entered, of which the following is an extract:

At a session of the Circuit Court of the United States for the Eastern District of Michigan, held at Detroit, &c., on Wednesday, the 8th day of December, 1880.

NELSON LYON  
against  
GUYON T. FISHER, et al.

It is ordered, adjudged and decreed, that the act entitled "An act for the relief of Nelson Lyon and Jeremiah S. James," passed by Congress and approved April 1, 1880, &c., is a good, valid and constitutional act.

That the original patent, bearing date July 9, 1872, and numbered 128,444, granted and issued to Joseph Baranoux, Jeremiah S. James and Nelson Lyon, when corrected by the Acting Commissioner of Patents, as directed by said act, was a good and valid patent.

That the said Joseph Baranoux was the original and first inventor of the improvements in metallic stiffeners for boots and shoe heels mentioned and described in said letters patent.

That the Reissued Letters Patent No. 312, dated May 11, 1880, granted to said Nelson Lyon for an improvement in metallic heel stiffeners for boots and shoes, originally patented as aforesaid, is a good and valid patent; that said Lyon is exclusively possessed of said Letters Patent; and the invention thereby secured.

That the defendants, G. T. Fisher & Co., and each of them, have infringed upon the said patent and upon the exclusive rights of said Lyon under the same.

That said Lyon receive of said defendants all the profits, &c., they have made, and in addition thereto all the damage he has suffered by reason of the infringement by the defendants, and also the costs, charges and disbursements in the action.

It is also further ordered, adjudged and decreed, that a perpetual injunction be issued against said defendants, according to the prayer of the said complainant's bill.

You are also hereby notified that the perpetual injunction has been issued and served on the defendants.

All questions as to damages and settlements in relation to infringements under my patents must be addressed to and made with my attorney, WILLIAM H. KING, in my care at the above address.

**NELSON LYON.**  
**SABIN MFG. CO.,**  
MONTPELIER, VT., MANUFACTURERS OF

DOUBLE-ACTING SPRING BUTTS,

SABIN'S LEVER DOOR SPRINGS, For heavy doors,

BOSS AND CROWN SPRINGS, For light doors.

Send for Catalogue. Represented in New York by DAVID HEMER & CO., 99 Church St.

**RIVETS** C. F. HARRISON, **RIVETS**  
BOILER, BRIDGE & TANK  
CUYAHOGA FALLS, OHIO.



New York Wholesale Prices. November 9, 1881.

## HARDWARE

[illegible][illegible]

**Cutlery.**  
Meriden Cutlery Co. (Table).....  
Am. Miller Bros.' Cutlery Co.....  
Wm. Rogers' Cutlery Co. Pocket.....  
Nauvoo Cutlery Co.....  
Aaron Bucklins' Cutlery Co. Pocket.....

**Dog Collars.**  
"Hound Collar".....  
Leather.....  
Brass.....  
"Hound Collar".....

**Door Springs.**  
Forrey's Rod.....  
Gray's.....  
Free Rod.....  
Gem (Coll.).....  
No. 1, Large, Japanned.....  
No. 2, Small.....  
No. 3, Small.....  
Star (Coll.) For Cop'd Nickel-Plated, etc.....  
No. 5, Screen Door Size.....  
No. 6, Medium.....  
No. 7, Small.....  
Babin's Lever.....  
Babin's Boss.....  
Babin's Bolt.....  
Philadelphia.....  
Barker's Concealed.....  
Babin's Bolt.....  
Rubber, complete.....  
Hercules.....

**Drills and Drill Stocks.**  
"Blacksmiths".....  
Blacksmiths' Self Feed'ng.....  
Brest.....  
Hutchins.....  
Brest, Wilson's.....  
"Miller's Falls".....  
"Bartholomew's".....  
Hatchett.....  
"Ingersoll's".....  
"Whitney's".....  
Wilson's Self Feeding.....  
"Moore's Triple Action".....  
Whitney's Hand Drill.....  
Wilson's Self Feeding.....  
Automatic Borax Tools.....  
**Drill Chucks—Morse's Beach Patent**.....  
Danbury.....

**Egg Beaters.**  
Dover.....  
Acme.....  
Standard.....  
Family.....  
**Elevator Buckets.**  
Mill E. Buckets, light, 3/4 to 10 in. (Duc's Improved).....  
Mill E. Buckets, heavy, 5/8 to 10 inches (Duc's Improved).....  
Storehouse, Duc's Pat. 10 to 17.....  
Regular numbers.....  
Flour and F.F.....  
Sibley's Emery and Crocus Cloth.....  
Large size, 10; Medium, 10.50 per ream; 12.....

**Enameled and Tinned Ware.**  
Kettles.....  
Sauce Pans.....  
Tinned Sauce Pans.....  
**Kenteneben Pins.**  
Kenteneben.....  
**Kenteneben.**  
Door Lock.....  
Brass Thread.....  
Wood.....

**Knives.**  
Bohren's Pat. Rubber Ball.....  
Parr's Cork Stops.....  
Star.....  
Pray's Patent Petroleum.....  
West's Patent Key.....  
Metallic Key, Leather Lined.....  
Enterprise (Self Measuring).....  
J. Sommer's Best Metallic Key.....  
Sawyer's Corvett, 1st quality.....  
**Felice Plates.**  
Filles.....  
Auburn.....  
E. M. Boynton's.....  
J. & Riley Carr, Horse Kaaps.....  
Johnson & Co.....  
Walter Spencer & Co.'s "Diamond".....  
Fisher's.....  
H. Diston & Sons (new list).....  
Holler Bros.' Horse Kaaps.....  
New American.....  
Union Fire Co.....

**Fluting Machines.**  
Knox, 3/4-inch Roll.....  
Perkins, 1/4-inch Roll.....  
Engle, 3/4-inch Roll.....  
Eureka, No. 1, 7-inch Roll.....  
Crown, 3/4-in. 3/8 to 1-in. 8.00 each 10 in.....  
Star.....  
American, 1 in., 3/8 to 1 in. 8.50 each 10 in.....  
Domestic Fluter.....  
Crown Hand Fluter, No. 1, 1.15; No. 2, 1.15; No. 3, 1.10.....  
Clark's Hand Fluter.....  
Combined Fluter and Sad Iron.....  
Buffalo.....

**Fluting Saws.**  
Fly Traps.....  
Paragon.....  
**Forks.**  
Fruit and Spading.....  
Pined.....  
Reed & Barton.....  
**Fruit and Jelly Presses.**  
Enterprise Mfg. Co.....  
Fry Fans.....  
Burnished, list as follows.....  
"Acme".....  
**Gauges.**  
Marking, Stanley's.....  
Chapin's.....  
"Dixton's".....  
**Glimets.**  
Nail and Spike.....  
Eureka.....  
Diamond.....  
Dixton Cut, Shear.....  
"Ives".....  
Doughlass.....  
**Grip Poles.**  
"Family, Hove's Eureka".....  
L. F. & Co.'s "Handy".....  
**Grindstone Fixtures.**  
Reading Hardware Co., new list.....  
**Gum Wads.**  
M. C. B. E. 11 up.....  
"F. E. 11 up.....  
"F. E. 11 up.....  
"F. E. 11 up.....  
**Halters.**  
Covert's Pat. Rope.....  
"Cattle Ties, Covert's".....  
**Hammers.**  
Raydon's.....  
Benny's.....  
Tumason & Beckley.....  
Farmer & Noble's.....  
"F. E. 11 up.....  
"F. E. 11 up.....  
"F. E. 11 up.....  
"F. E. 11 up.....

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Bayne Pettibone & Son, new list.....	dis 20 5
Remington's (Lowman's Patent).....	dis 25 8
Shovel.....	dis 20 5
Iron and Brass Head, E. & E. list.....	dis 60 8 5
Polished Steel.....	new list, dis 20 5 5
<b>Stakes.</b>	
Square Shanties.....	by case, dis 70 5
Less than a case.....	dis 60 2 5
<b>Spoke Naves.</b>	
Drum, Metallic.....	dis 20 5 5
Iron.....	dis 20 5 5
Wood.....	dis 20 5 5
Wash. Stone (Chase) & L. Co.'s new list.....	dis 20 5 5
Stearns.....	dis 20 5 5
<b>Spoke Trimmers.</b>	
Bonney's.....	per dos \$300, dis 20 5 5
Stearns.....	per dos \$300, dis 20 5 5
Douglas.....	per dos \$300, dis 15 5
<b>Spoons.</b>	
Basting.....	dis 60 20 5
Riveted T. and T. and New.....	dis 60 5
Salt Table and Tea.....	dis 60 5
Reed & Barton.....	dis 60 5
Hall & Elton.....	dis 40 5 5
German Silver.....	dis 40 5 5
Cast Steel.....	dis 35 5 5
T. P. S. & W. A. Table.....	dis 25 5 gross, net
Tin (Foster Hdw Co.).....	dis 10 5
case lots.....	dis 10 5
<b>Stocks and Dies.</b>	
"Lightning" Screw Plate.....	dis 10 5
<b>Stone.</b>	
Hindstone No. 1, 6 c. Axe, 8 c.....	dis 20 5
Hindstone Hacker Stone.....	per gross \$200, dis 20 5
Bond Stone.....	per gross \$200, dis 20 5
Wash. Stone.....	No. 2, 10 c. 10 5
Slips.....	No. 1, 10 c. 10 5
Arkansas Stone No. 1, 6 c. to 8 in.....	per gross \$200, dis 20 5
Turkey Oil Stone (Chase).....	to 6 in, \$100 5
Slips.....	to 6 in, \$100 5
Lake Superior (Chase).....	per gross \$200, dis 20 5
Slips.....	per gross \$200, dis 20 5
Grindstones & Emily, Loring's.....	dis 20 5
<b>Stove Polish.</b>	
Joseph Dixon's.....	per gross \$200, dis 10 5
Gold Medal.....	per gross \$200, dis 10 5
Mirror.....	per gross \$200, dis 10 5
Rising Sun.....	per gross \$200, dis 10 5
Dixon's Plumbage.....	per gross \$200, dis 10 5
<b>Squares.</b>	
Iron.....	dis 5 5; full cases, dis 20 5 5
Painted.....	add \$2.00 to \$200 5 per doz, net
7 1/2 Square and 8 1/2.....	dis 20 5
Dixson's 7 1/2 Square and 7 1/2.....	dis 20 5
Winterbottom's 7 1/2 and 7 1/2.....	dis 20 5
<b>Sticks, Brads &amp;c.</b>	
Tinned Swedes Tacks.....	dis 10 5
Tinned Swedes Tacks.....	dis 10 5
Swedes Tacks all kinds.....	dis 35 5
Copper Tacks and Nails.....	dis 35 5
Swedes Tacks.....	dis 35 5
Gimp and Lace Tacks.....	dis 35 5
Finishing Nails.....	dis 35 5
Trunk and Clout Nails.....	dis 35 5
Common and Patent Brads.....	dis 35 5
Brush Tacks.....	dis 25 5
Leathered Carpet Tacks.....	dis 35 5
Clay Nail.....	dis 35 5
Chair Nails.....	dis 35 5
Jointing Tacks.....	dis 35 5
<b>Tap Borer.</b>	
Common or Ring.....	dis 20 5
Ives' Tap Borer.....	dis 10 5
Enterprise Mfg. Co.....	dis 20 5
<b>Tapes, Measuring.</b>	
American.....	dis 20 5
Spring Tapes.....	dis 20 5
<b>Thermometers.</b>	
Tin Case.....	dis 70 5 5
<b>Throat Cutters.</b>	
Enterprise Mfg. Co. (Chambliss).....	dis 25 5
Wood Bottom.....	per dos \$200, dis 20 5
Nashua.....	per dos \$200, dis 20 5
Wilson's.....	per dos \$200, dis 20 5
<b>Timber's Tools and Machines.</b>	
Machines (P. & F. W.).....	list add 20 5
Tools (P. & F. W.).....	add 20 5
<b>Transom Lifters.</b>	
Hollenack's Patent.....	dis 15 5
Excelsior.....	dis 20 5
<b>Traps.</b>	
Camp House.....	dis 15 5
Blake's Patent.....	dis 20 5
Moose.....	dis 20 5
Round Wire.....	per dos \$200, dis 20 5
Cage.....	per dos \$200, dis 20 5
Rat.....	per dos \$200, dis 20 5
<b>Trowels.</b>	
Best's Brick and Plastering.....	dis 25 5
Dixson's Brick and Plastering.....	dis 20 5
Clement & Maynard's.....	dis 20 5
Best's Brick.....	dis 15 5
Worral's Brick and Plastering.....	dis 20 5
Garden.....	dis 20 5
Butter and Cheese.....	dis 20 5
<b>Vises.</b>	
Solid Box.....	List of July 1, 1880, dis 15 5
Peter Wright's.....	dis 10 5
Wilkinson's.....	dis 10 5
Parallel.....	dis 10 5
Wilson's.....	dis 10 5
Howard's.....	dis 20 5
Bargen's.....	dis 15 5
Trenton.....	dis 30 5
Oval Slide.....	dis 20 5
Pringle Screw Leg.....	dis 15 5
Simpson's Adjustable.....	dis 20 5
Family List.....	dis 20 5
Stearns.....	dis 20 5
Hopkins.....	dis 20 5
Reading.....	dis 20 5
Lowell Stand.....	dis 20 5
Richardson's Vice and Anvil.....	dis 20 5
<b>Washer Cutters.</b>	
Johnson's.....	per dos \$200, dis 20 5
Penny's.....	per dos \$200, dis 20 5
Washers.....	per dos \$200, dis 20 5
<b>Washers.</b>	
See Nuts and Washers.....	dis 20 5
<b>Well Wheels.</b>	
Wire.....	dis 20 5
Brigs and Conner.....	dis 20 5
Conner.....	dis 20 5
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 in building the same, will give superior work to all  
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**Gear Cutting a Specialty.**  
 237 Water Street,  
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**A. PARDEE & CO.**  
 237 South Third St.,  
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**MINERS AND SHIPPERS OF**  
**Lehigh Coals.**

The following superior and well-known Lehigh  
 Coals are mined by ourselves and firms connected  
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A. Pardee & Co. {HAZLETON,  
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**EMPIRE STATE MFG. CO.**  
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Copper,  
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 Nickel Plated  
**TEA KETTLES.**  
 Metal Spinning.





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**CARNEGIE BROS. & CO., LIMITED,**  
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**EDGAR THOMSON STEEL WORKS DEPARTMENT.**  
Works at Bessemer Station, P. R. R.

Branch Office and P. O. Address, 48 Fifth Ave.,  
MANUFACTURERS OF



OF SUPERIOR QUALITY.

**Union Iron Mills Department**  
Mills at Thirty-third St. and A. V. R. R.

Branch Office and P. O. Address, Thirty-third St.  
MANUFACTURERS OF

## STRUCTURAL IRON.

Bridge Iron, Iron Beams, Channel Bars, Car Truck Channels, Angles, Tees, Universal Mill Plates, Bar Iron, Light Steel and Iron Rails.

Special attention given Unusual Shapes and Sizes.

Lithographs of sections and book of detailed information giving calculation of strain, &c., furnished to Engineers and Architects on application.

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**NORTH CHICAGO ROLLING MILL CO.**

ESTABLISHED 1857. CAPITAL, \$3,000,000. INCORPORATED 1869.  
Works at Chicago, Ill., and Milwaukee, Wis.

MANUFACTURERS OF

**MERCHANT BAR, FISH PLATES, PIG METAL, IRON RAILS & BESSEMER STEEL RAILS.**

Present Annual Capacity of these Works.	Fish Plates.....13,000 tons
	Merchant Bar.....40,000 "
	Pig Metal.....140,000 "
	Iron Rails.....110,000 "
	Steel Rails.....100,000 "
	Total Capacity per year.....403,000 "

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Crucible Tool, Cast Spring, Cast Plow, Iron Centre, Soft Centre, and Iron Back Plow, also Open Hearth Spring, Tire, Plow, Machinery, and

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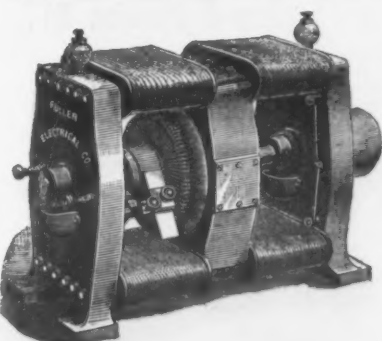
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STEEL RAILS, STEEL WIRE RODS,  
STEEL BLOOMS, SPIEGELEISEN,  
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**THE FULLER ELECTRICAL COMPANY,** having perfected their system of Electric Lighting, are prepared to furnish the Improved Gramme Dynamo Electric Machines and Electric Lamps, either for single lights or for from 2 to 20 lights in one circuit.

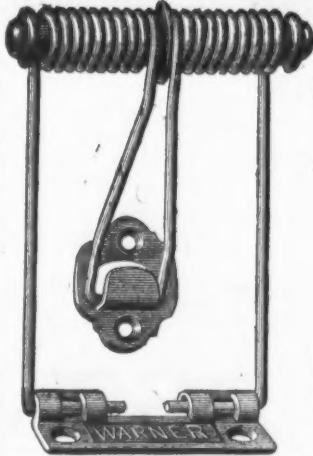
This apparatus is unexcelled for durability, steadiness of light and economy of power, and requires less attention than any other.

For Price List and further particulars apply to

**The Fuller Electrical Co.,**

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# THE "WARNER" DOOR SPRINGS



are the most simple, most effective and most convenient ever introduced, and the immense sale we are having shows their great popularity and superiority.

There never was a Spring made that is so durable, so complete in its action, operating with a uniform pressure, holding the door tight when closed, and allowing it to open without increasing the pressure at any point.

When the door is opened about 130 degrees of a circle, it will press and hold it open.

The Spring is easily unhooked and rehooked—in an instant—from the door and also from the jamb, without removing a screw or pin.

This is a Convenience Possessed by no other Spring in the Market.

We are making this season three sizes, viz:

No. 1 For Screen or Light Storm Doors.

No. 2 For Medium Doors.

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They are for sale by most of the prominent jobbers of the United States and Canada.

Correspondence solicited.

**FREDERIC BARTLETT,**  
FREEPORT, ILLINOIS.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.  
THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.  
OFFICE: 44a CANNON STREET, LONDON, E. C.

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**Notes of Novelties.**—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.

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to the *Ironmonger* and *Metal Trades Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from any date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain. To every subscriber is presented, free, in the course of his year, a handsome and useful *Ironmongers' Diary and Text Book*, a work sold to non-subscribers at 75 cents.

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This is an annual, presented free to every Subscriber to the *IRONMONGER AND METAL TRADES ADVERTISER*. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

## THE FOREIGN SUPPLEMENT,

With which is incorporated The Universal Engineer.

Is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication for the next twelve months will be as follows:  
DECEMBER 3 and 31, 1881, JANUARY 28, FEBRUARY 25, MARCH 25, APRIL 22, MAY 20, JUNE 17, JULY 8, AUGUST 5, SEPTEMBER 2 and 30, and OCTOBER 28, 1882.

This Supplement is published in

### FOUR LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach out in the native language of eighty millions of German, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

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Advertisers will do well to use illustrations freely. Where economy of space is an object, a left page illustrated is described in one language can be suitably described in four or more languages on the opposite or right page without illustrating.

### THE WHOLE FOREIGN HARDWARE TRADE

so far as our experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger* and *Foreign Supplement* is a strikingly powerful and most efficient way of publicity not to be compared with any of the other ordinary channels of communication.



## B. KREISCHER & SONS, FIRE BRICK.

BEST AND CHEAPEST.  
Established 1845.  
Office, foot of Houston Street, East River,  
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## NEWTON & CO.,

ALBANY, N. Y., Manufacturers of

## FIRE BRICK

Stove Linings,

Range and Heater Linings

Cylinder Brick, &c., &c.

For Glass and Steel Works.

## SILICA,

Bricks and Cement,

English Fire Bricks.

RIMINGTON BROS. & CO.,

Newcastle-on-Tyne.

Agent on this side

S. A. RIMINGTON,

40 & 42 Broadway,

NEW YORK.

M. D. Valentine & Bro

Manufacturers of

## FIRE BRICK

And Furnace Blocks

DRAIN PIPE & LAND TILE.

Woodbridge, - - - N. J.

BORGNER & O'BRIEN,

Manufacturers

## FIRE BRICK

AND

Edge Pressed Furnace Blocks,

CLAY RETORTS, TILES, &c.,

Twenty-third Street,

PHILADELPHIA.

WATSON FIRE BRICK CO.,

ESTABLISHED 1856.

Successors to JOHN R. WATSON, Perth Amboy, New Jersey

Manufacturers of

## FIRE BRICK,

FOR ROLLING MILLS, BLAST FURNACES, FURN-

DRIES GAS WORKS, LIME KILNS, TANNERIES,

BOILER AND GRATE SETTING, GLASS WORKS, &c.

Fire Clays, Fire Sand, and Kaolin for Sale.

HENRY MAURER,

Proprietor of the

Excelsior Fire Brick & Clay

Retort Works,

Manufacturer of FIRE BRICK, HOLLOW

BRICK AND CLAY RETORTS.

WORKS: PERTH AMBOY, NEW JERSEY.

See & Depot: 418 to 422 East 23d St., N. Y.

TROY FIRE BRICK WORKS,

Troy, N. Y.,

JAMES OSTRANDER & SON,

ESTABLISHED 1848,

Manufacturers of

## FIRE BRICK,

Tryonville, Pa., Blast Furnace Blocks, &c. Miners and

colliers. Woodbridge Fire Clay and sand, and Staten

Island Kaolin.

Established 1864.

GARDNER BROTHERS,

Manufacturers of

STANDARD SAVAGE FIRE BRICK,

TILE & FURNACE BLOCKS,

OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings, and

Miners and Shippers of Fire Clay.

Office: 116 Smithfield St., Pittsburgh, Pa.

WORKS: Mt. Savage Junction, Md., and Lockport, Pa.

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CHAS. D. COLSON,

## FIRE BRICK,

Foundry Facings, Sand, Tools and Supplies.

CHICAGO, ILL.

UNION MINING COMPANY,

Mount Savage Fire Brick.

EDWARD J. ETTING, Agent,

No. 220 South Third St., Philadelphia, Pa.

THOMAS MORTON,

Manufacturer of

CABLE, COPPER, IRON AND STEEL SASH CHAINS.

for suspending window shades. Also, Copper Chain-

gears, Chains, with patent attachments, for same pur-

pose. Agents wanted in the principal cities in the

United States. Apply at

65 Elizabeth Street, New York.

# HENRY DISSTON & SONS,

KEYSTONE SAW, TOOL, STEEL & FILE WORKS,

Front and Laurel Streets,

PHILADELPHIA.

## DISSTON'S SAMSON TREE PLANTER AND POST HOLE DIGGER.

Fig. 1.

Patented May 29, 1870.

Price, - - - \$37.50 per dozen.

Fig. 2.



No Farmer, Nurseryman, Railroad  
or Telegraph Company  
SHOULD BE WITHOUT ONE.

NO BACK-ACHE.

NO KNEE-WORK.

NO CLOGGING.

This tool has been thoroughly tested, and has given the greatest satisfaction to all who have tried it. The principle on which it works makes it self-cleaning and prevents adhesion in sticky soil; therefore it always works free and easy. It is far superior to all plungers, augers and boring machines, as it works well in stony, sandy, or clay soils; quicksand under water is as easily removed as though no water existed.

### DIRECTIONS.

Plunge the Digger into the ground, as shown in cut, Fig. 1, and when the soil is loosened pull out the lever with one hand, as shown in cut, Fig. 2, which will press the dirt between the blades; then draw the Digger from the hole, keeping hold of the lever with one hand and the handle with the other. When the Digger is clear of the hole, you can deposit the load anywhere within reach by simply pressing down the lever, which will open the blades and the dirt will fall from between them. The Digger is then ready for another plunge. The steel blades are nine inches long, and the whole tool five feet long. For sale at Hardware and Agricultural Stores.

## HENRY DISSTON & SONS.

### STANDARD SHAFT COUPLING SPRING.

Chicago, Ill.

Patented.

Gentlemen:

You may enter

our order for

5000 sets of your

Standard Shaft

Coupling Springs

(500 sets a month).

A. A. ABBOTT

& CO.

CHICAGO, ILL.

Side View.

One dozen pairs, japanned

expressed to the respos-

sible Hardware or Carriage

trades for \$1.50 (per gross,

\$15.00 net, 5 per cent.

off 30 days, 10 off spot cash).

Discount to jobbers. Splen-

did selling article for com-

mercial travelers. Nickel-

plated springs \$3 per doz.

pairs. Dealers and the

trade also supplied by the

E. D. Clapp Mfg. Co., Au-

burn, N. Y., and Wilcox &

Mrs. Carriage Trimmings, Binghamton, N. Y.

Perfect Anti-Batter and Shaft Bolt Locker, and loose

nest on a buggy. Sold by all hardware dealers every-

where. Orders, large or small, filled promptly.

A. G. MOOREY & CO., 90 Randolph Street,

(McCormick Block), CHICAGO.

Manufacturers for U. S. & Canada, under Letters

Patent.

Front View.

Howe, Birmingham, Conn.;

Crandall, Stone & Co.,

Mrs. Carriage Trimmings,

Binghamton, N. Y.

Perfect Anti-Batter and Shaft Bolt Locker, and loose

nest on a buggy. Sold by all hardware dealers every-

where. Orders, large or small, filled promptly.

A. G. MOOREY & CO., 90 Randolph Street,

(McCormick Block), CHICAGO.

Manufacturers for U. S. & Canada, under Letters

Patent.

WM. L. DAVIS, Chelsea, Mass.,

Manufacturer of

WINDOW WEIGHTS,

Sole Manufacturer of

Park's Patent Folding Lunch Box.

Curtis Pressure Regulator.

Is made entirely of metal; occupies the same space

as a globe valve. It has no glands or packing, and is

a lock-up valve. Write for circular. Manufactured by

CURTIS REGULATOR CO.,

59 Beverly Street, BOSTON, MASS.

HOWARD IRON WORKS,

BUFFALO, N. Y.,

Manufacturers of

BENCH VISES,

Price Lists sent on application.

STEEL STAMPS

RUBBER STAMPS

BRASS STAMPS

STENCIL BRANDS

PAINT STAMPING INK &c.

A. M. MICHAEL, ALBANY, N. Y.

Brass Molders and Manufacturers

write for sample and price of Fine Red Brass

Molding Sand.

W. J. CHAPMAN, Baltimore, Md.



Gentlemen.—This cut illustrates our

CAST IRON

## Furnace Lamps

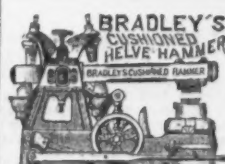
which are superceding entirely the Tin Lamps  
wherever introduced, in consequence of their du-  
rability. They are now extensively used in the  
Iron Districts of Ohio and some in Pennsylvania.  
We call your attention to and solicit your order  
for them, confidently asserting that they are an  
A. No. 1 article in every respect.

Sample sent if desired.

PRICE, \$12 PER DOZEN.

Taylor & Boggis,

CLEVELAND, O.



## Bradley's Cushioned Helve Hammer

Awarded first premium, Silver Medal, at American Institute Fair  
1873; Cincinnati Industrial Exposition, 1874 and 1880, and the Diploma  
of Honor and Grand Medal of Merit at the Centennial Exhibition in  
1876, being the highest award given any goods of their class in Amer-  
ica or Europe. It has more good points, does more and better work,  
takes less power, costs less for repairs, than any Hammer in the  
world. Guaranteed as represented. Established 1832.

BRANCH OFFICE,

46 & 48 West Lake St.,

CHICAGO, ILL.

BRADLEY & COMPANY, Syracuse, N. Y.

## Wyoming Shovel Works,

WYOMING, LUZERNE COUNTY, PA.

Patent Plain Back Solid Shovels and Spades, Back Strap Shovels,

Spades and Scoops.

RAILROAD AND MINERS' SHOVELS of Superior Quality a Specialty.

Send for Price List, &c.

PAYNE PETTEBONE & SON.

## GREEN'S PURE SILICA FIRE BRICK,

MADE BY

## LACLEDE FIRE BRICK MANUFACTURING CO.,

SPECIALLY ADAPTED FOR

## Pernot and Siemens Open Hearth

Steel Furnaces and for Glass Furnaces.

Office, 901 Pine St., St. Louis, Mo.

John T. Lewis & Bros.  
No. 231 South Front St.,  
PHILADELPHIA.



Pure White Lead, Red Lead, Litharge,  
Orange Mineral, Linseed Oil,  
AND PAINTERS' COLORS.

Brooklyn White Lead Co.



White Lead, Red Lead & Litharge.  
No. 182 Front Street,  
NEW YORK.

JOHN JEWETT & SONS,  
Manufacturers of the well-known brand of  
WHITE LEAD.



TRADE MARK  
ALSO MANUFACTURERS OF  
LINSEED OIL.  
181 Front Street, NEW YORK.



The Atlantic White Lead and  
Linseed Oil Co.,

Manufacturers of

White Lead (Atlantic), Red Lead, Lith-

arge, Glass Makers' Litharge and

Orange Mineral;

LINSEED OIL,

Raw, Refined and Boiled.

ROBERT COLGATE & CO.,

387 Pearl St., NEW YORK.

A. F. PIKE,

Pike Station, - - - New Hampshire,

Manufacturer and Wholesale Dealer in

Bluestone

For Scythes, Axes, Knives and Turpentine Hacks.

Factories at Pike Station, N. H.,

and Evansville & Westmore, Vt.

Genuine Old Reliable,

Indian Pond (Red End),

Premium Union,

White Mountain,

Letelle, Hacker,

Diamond Grit,

The New Bone,

Lamplighter, Hagg,

Willoughby Lake,

Green Mountain,

Black Diamond,

Moving Machine,

German Pattern,

Chocolate, Ax Bits,

Stones made, labeled and branded in any style de-

sired. PRICE AND QUALITY GUARANTEED. All the above

brands are of clear, &c. on grit and will not glass.

Mellert Foundry & Machine Co.,

Limited.

(Works Established at Reading, Pa., in 1848.)

Manufacturers of

CAST IRON WATER TIGHT STEEL

Specials, Flange Pipe, Retorts, Valves and Hydrants,

Lump Pits, &c. The Improved Canadian Tur-

bine Water Wheel, Machinery and Castings

for Furnaces, Rolling Mills, Grist and Saw Mills, Min-

ing Pumps, Hoists, &c. Columns, Brackets, Iron



*Corrected Weekly by Lloyd, Supples & Walton.)*  
 terms, 30 days. For 60 or 90 days, interest added at 10  
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11      NO L..... 229
12      NO L..... 11
13      SINS ..... 41
14      AXE ..... 130
Turkey Oil Stone No. 1..... 100
Hindotan Oil stone No. 1..... 100
15      AXE Stone ..... 8c
16      SINS ..... 100

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Round Head Brass	.....	dia 35 %
" Iron	.....	dia 24 %
Spoons, Plated	.....	dia 30 %
	.....	dia 40. 5/8 %

Quartz Nail Rods.....	1.00
Burway.....	1.00
Guard Iron.....	1.00
Drag Bars.....	1.00
Dropper Bars.....	1.00
Cylinder and Landside Iron.....	1.00
Flow Beam Iron.....	1.00

See Pittsburgh Trade Report.  
**Best Quality Refined Cast Steel.**  
*Square, Flat, Octagon and Round.*  
 1/4 to 2 inches, inclusive... ..110



lived and cheaper than any  
hydraulic jack.

**GEO. A. OHL & CO.,**  
East Newark, N. J.

## GARDEN OR FARM BARROW



We also manufacture a full line of

**RAILROAD, ORE, BRICK and STONE BARROWS.** Also,  
**Road Scrapers, Road Plows, Levelers, &c**

**REVOLVING SCRAPER CO.,**  
COLUMBUS, - - - - - OHIO, U. S. A

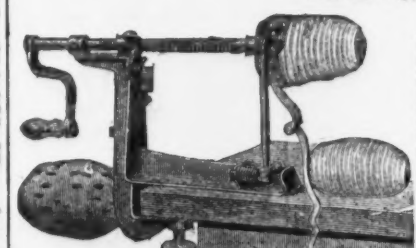


Manufacturers of  
**SHEET IRON WARE**

**SHEET IRON WARE**  
Patent Corrugated Bottom Coal Hods,  
**PATENT ACME FRY PAN**  
Edgar's Patent "Gem," "Victor," "U. S.," "Climax"  
and "O. K." Stove Shovels.  
**POLISHED FRY PANS, &c.**  
Send for Catalogue.

**GOODELL'S WHITE MOUNTAIN POTATO PARER**

Patent Applied For.



The White Mountain Potato Parer is the only machine ever made that will not only pare a potato much better than it can be done by hand, taking off a thinner paring from every shape of kind of potato, but will go into and clean out the eyes, and altogether at a saving of at least 30 per cent. It does not require any power or labor to the old style of rattlepar, geared parers; is solid and substantial, cannot get out of order, and so cheap as to be within the means of everybody.

Almost any of the Potato Parers in the market come under the name of "White Mountain." Next time, but the "White Mountain" DOES IT NOW! Every Machine warranted as represented.

**Price to the Trade, \$8 per dozen.**

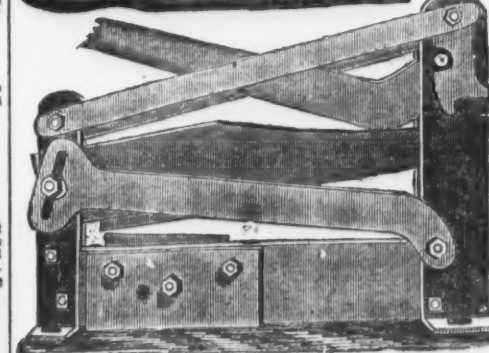
CORRELL CO., Agents, N. H. U. S. & MEX.

## PATENT WROUGHT IRON SHEAR




With and Without

**BUNCH ATTACHMENT**



**FOR IRON AND STEEL.**

Our No. 102 Machine will cut  $\frac{1}{8}$ " round and square and punch  $\frac{1}{4}$ " hole through  $\frac{1}{4}$ " plate.  
Our No. 104 Machine will cut  $\frac{1}{8}$ ",  $\frac{1}{4}$ " round and square and punch  $\frac{1}{4}$ " hole through  $\frac{1}{4}$ "-inch iron.  
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The Best Boiler Feeder  
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"What makes you stand such rooting and things,  
When to stop it you only need HILL's Hoo Rroos?"  
Mad Muller listened, a glad surprise  
Beamed from his lately blazing eyes.  
He bought the rings and he tried them on.  
And a victory over those hogs he won.  
No longer as mad a fend was he,  
As he walked abroad his corn to see,  
For each big hog, with a ring in his snout,  
Was slowly and harmlessly grunting about.  
And the corn it sprouted and bravely grew,  
And made a big crop, as corn should do.  
And as he looks at his fields, he then  
Softly whispers "It might have been  
That I in the fall would have no corn to show  
Had Hill's Hoo Rroos (Triangular) not helped  
me so."

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Of the man who invented those blessed Hoo Rroos.



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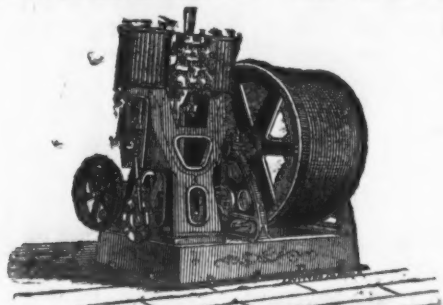
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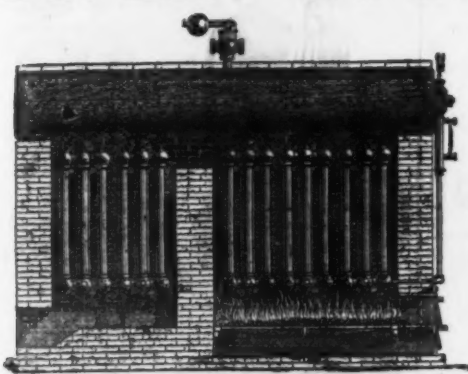
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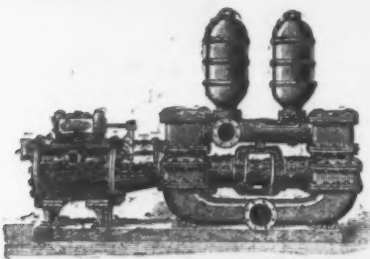


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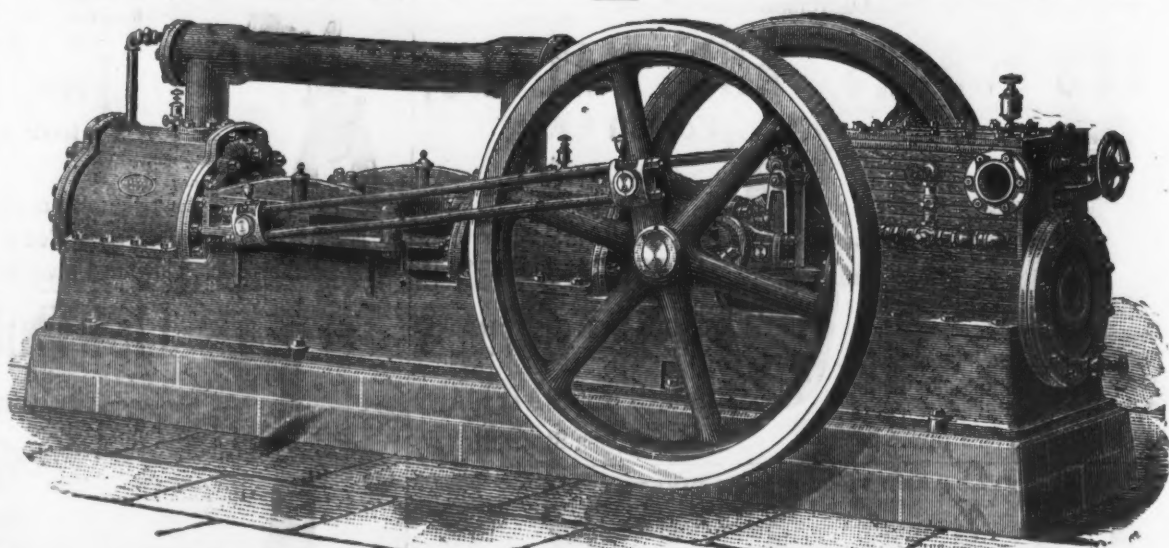
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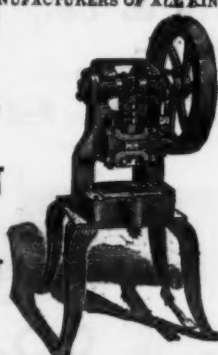
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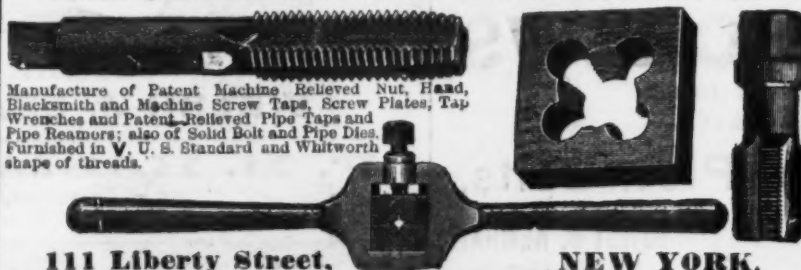
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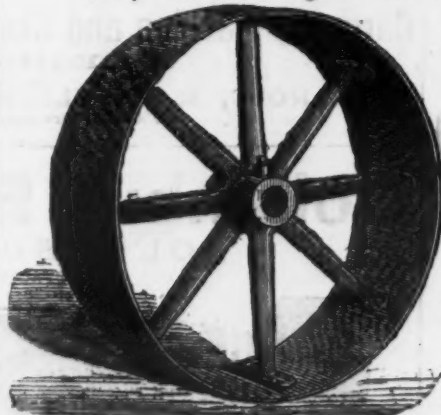
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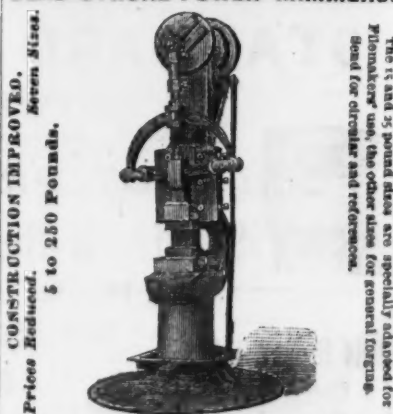
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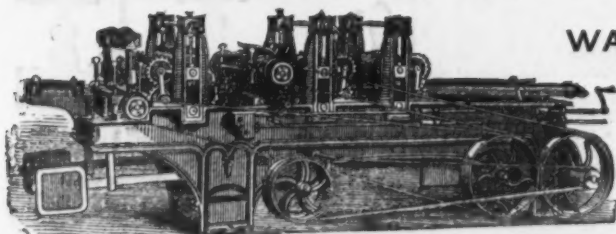
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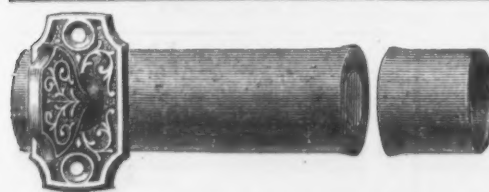
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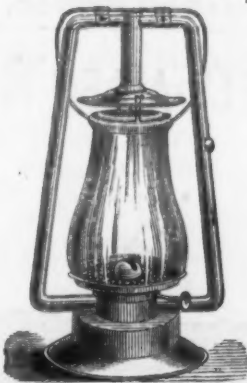
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1.25	65	1 3/4 " "	5 " "
1.75	66	2 " "	6 " "
2.25	67	2 1/4 " "	7 " "
3.25	68	2 3/4 " "	8 " "
4.50	69	3 " "	10 " "

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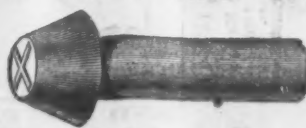


Per Pair.	No.	For Doors.	Size.
\$1.60	83	1 to 1 1/2 inch.	3 inch.
2.00	84	1 1/2 " "	4 " "
2.50	85	1 3/4 " "	5 " "
3.00	86	2 " "	6 " "
3.50	87	2 1/4 " "	7 " "
4.50	88	2 3/4 " "	8 " "
6.00	89	3 " "	10 " "

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